Socio-economic monitoring assessment of coastal management in the Colihaut, Dublanc and Bioche villages of Dominica

ALTHIA ST. LOUIS, DERRICK THEOPHILE, JULLAN DEFOE,
RHIANNAN PRICE AND ROSETTE LEWIS

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

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EXECUTIVE SUMMARY

Coastal management has justifiably become a priority throughout the world. The ecological and economic value of coastlines, reefs, beaches, fisheries, and marine life cannot be underestimated as the steady degradation of natural resources prevails worldwide. To avoid complete loss of such resources, decisions that impact the fragile coastal ecosystem must be carefully determined by the gamut of stakeholders. Sustainable development has delineated guidelines for improved management, but the process to sustainability is thwarted by a lack of information and conflicting stakeholder agendas.

An inherent lack of information makes socio-economic monitoring an important key in determining the most effective management strategies. Accounting for social, cultural, and economic influences strengthens the decision-making process by giving it a more accurate, holistic approach. Often, these influences are remembered only as they are passed down generation to generation, and subsequently, this anthropological information can be lost as values and traditions shift or change over time. The strength of the socio-economic assessment is the preservation of these important social and cultural values, not in isolation, but in tandem with equally significant factors such as economics and scientific data.

The purpose of this study is to preserve a social, cultural, and economic portrait of three coastal communities so that existing and future scientific data can be useful for their sustainable development. Since Dominica is promoted as a premier tourist destination and the "Nature Isle" of the Caribbean, the conservation of natural resources is necessary for ecological value and economic prosperity.

This study seeks to monitor impacts of present and proposed development with a view to ensure sustainable use of the resource base of the Colihaut, Dublanc, and Bioche communities along the west coast of the Commonwealth of Dominica. Report findings will assist coastal managers in monitoring the socio-economic impacts of development; increase stakeholder awareness of the importance of the resource base; identify demands for alternative livelihoods; and encourage stakeholder participation in decision-making. This rapid socio-economic assessment profiles the characteristics of user groups and their coastal activities as well as analyzes their perceptions regarding coastal resources and surrounding development.

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Citation

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Contact: Patrick McConney or Maria Pena
Centre for Resource Management and Environmental Studies
University of the West Indies, Cave Hill Campus, Barbados

Phone: 246-417-4316 Fax: 246-424-4204
Email:patrick.mcconney@cavehill.uwi.edu
Or email: maria.pena@cavehill.uwi.edu
Web site: http://www.cavehill.uwi.edu/cermes

1 INTRODUCTION TO FISHERIES SOCIO-ECONOMIC MONITORING IN DOMINICA

This site monitoring project is part of a larger regional project, *Socio-economic monitoring by Caribbean fisheries authorities (Fisheries SocMon)*, the aim of which is to increase and improve the use of site-specific socio-economic information in fisheries and coastal management decision-making by fisheries stakeholders in five locations – Barbados, Dominica, Nevis, Grenada and St. Vincent and the Grenadines.[1] The regional project is being implemented by the Centre for Resource Management and Environmental Studies (CERMES) at the University of the West Indies (UWI), Cave Hill Campus, Barbados. CERMES is the socio-economic monitoring (SocMon) lead organization for the English-speaking Caribbean.

The goal of CERMES in regards to the regional SocMon project is to establish a long-term, region-wide monitoring system for collecting, analyzing and comparing socio-economic data through collaborating coastal management programs across the wider Caribbean. It promotes cooperation among various stakeholders including coastal managers and community residents. CERMES also uses socio-economic information to best design and implement management decisions, increase awareness of the value of coastal resources and incorporate community concerns into decision-making.[2]

This study examines the socio-economic characteristics of the coastal resource user groups in the villages of Colihaut, Dublanc and Bioche (referred to as CDB in the rest of the report) along the west coast of Dominica. The demographics of each group are viewed in light of other important indicators such as user perceived influence, perception of resources, fishing statistics, and user awareness/concerns. The project goal and objectives of this site monitoring project as determined at the SocMon Caribbean training workshop held in Dominica from 14-16 May 2008 are listed below.

Goal: To monitor impacts of present and proposed development with a view to ensure sustainable use of the resource base of the Dublanc, Bioche, and Colihaut communities.

Objectives:
(1) To monitor the socio-economic impacts of development
(2) To increase stakeholder awareness of the importance of the resource base
(3) To identify demands for alternative livelihoods
(4) Encourage stakeholder participation in decision-making

As a site-specific assessment of a three village catchment area, the socio-economic survey complements existing secondary information to offer a depiction of social, economic, and cultural considerations that addresses stakeholders concerns. In general, socio-economic assessments provide a nexus for scientific findings and the human element. By analyzing scientific data from the perspective of cultural, social and economic implications, the best strategies can be achieved. These assessments aim to provide a framework for sustainable use of coastal resources thus designing strategies for

[1] Pena, M., P. McConney, A. Barrett, J. Cottle, C. Isaac, J. Leslie and A. St. Louis. In press. Socio-economic monitoring by Caribbean fisheries authorities: Preparation, monitoring site selection and training workshops. Gulf and Caribbean Fisheries Institute 61.

[2] Centre for Resource Management and Environmental Studies (CERMES). http://www.cavehill.uwi.edu/cermes/

management, awareness/education programs, policy reform, and future research and monitoring.[3] This assessment will thus become a guide for collaborative management strategies for the stakeholders of the Colihaut, Bioche and Dublanc communities.

2 BACKGROUND TO DOMINICA SOCMON STUDY SITES

The villages of Colihaut, Dublanc, and Bioche are located along the northwest coast of the Commonwealth of Dominica approximately 14 miles north of the capital in Roseau. These three villages form the Parish of St. Peter (Figure 1). As of the 2001 National Census, St. Peter's Parish had 1,451 residents.[4] With a population of 773 persons, Colihaut is the largest of the three communities and the most southern. Bioche is approximately five miles north from Colihaut with a population of over 250 persons; Dublanc is one mile north of Bioche with over 450 residents.

Residents of the St. Peter's Parish earn a living through agriculture, fishing, public sector work, and entrepreneurial endeavors. Persons who struggle to find employment usually migrate, are underemployed, or remain unemployed. Of those that migrate, many send remittances to their families still in Dominica to supplement their incomes. According to the 2001 National Census, 522 Dominicans migrate each year, and high patterns of migration are often triggered by natural disasters, especially hurricanes. Between 1991 and 2001 population due to migration, deaths, and low birth rates. Primary Schools in Colihaut and Dublanc have decreased enrollment each year as a result of migration and diminishing birth rates.

In the parish of St. Peter, there is one youth skills training centre for young persons interested in computer repair and information technology, wood working, mechanical and technical training. Many young persons also engage in short term projects like road construction and maintenance, construction and quarrying.

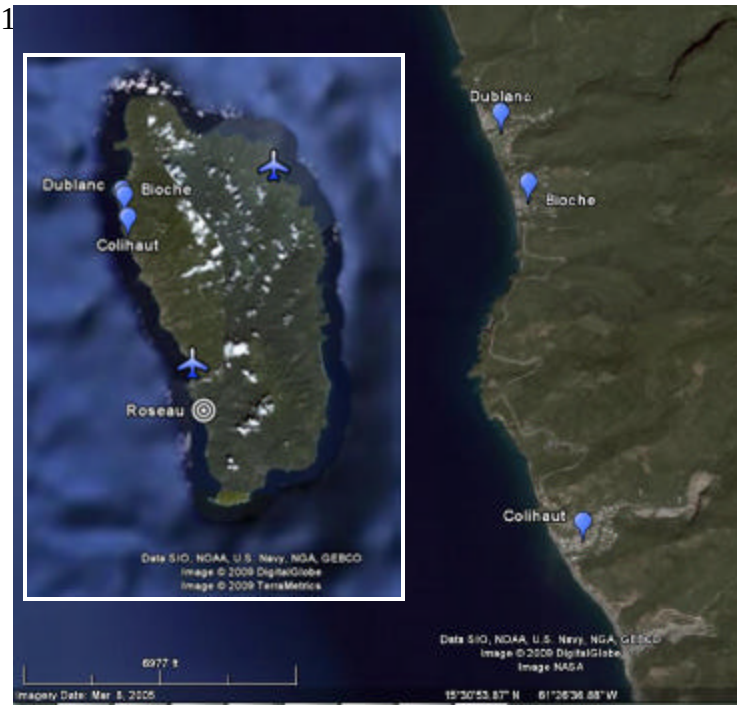

Figure 1 Map showing SocMon study site

Although the construction and service sectors are employing increasing numbers of young persons, fishing is part of the heritage and culture of the Colihaut, Dublanc and Bioche communities. Many fishers choose the occupation because of a desire to fish coupled with a strong family history in fishing. There are approximately 200 registered

[3] Bunce, Leah and Nohora Galvia. "The Hows and Whys of Socioeconomic Assessments." pgs61-63. In Best, B.A., R. S. Pomeroy and C. M. Balboa (eds.). Implications for Coral Reef Management and Policy: Relevant Findings from the Ninth International Coral Reef Symposium. U.S. Agency for International Development, in collaboration with, the World Resources Institute, Conservation International, and the International Society for Reef Studies, Washington, D.C. 113p. ReefBase Online Library. www.reefbase.org (accessed 10 April 2009).

[4] Dominica National Census. 2001.

full-time and part-time fishers in the Colihaut, Dublanc and Bioche area. Their types of fishing include trolling (ocean pelagics), beach seine, hand line (demersals and pelagics), and fish pots. Even St. Peter, for whom the parish is named, is the patron saint of fishermen. The Catholic Church is primarily responsible for the St. Peter's Festival; the priest blesses the fishers' boats, and there is a special mass to celebrate on June 29th each year. At last year's (2008) St. Peter's Mass, the community honored three fishers with lifetime achievement awards in recognition of their contributions in fishing. Fishing is more than a livelihood in this area. It is embedded in the culture, religion, and society.

As all three communities constitute the Parish of St. Peter, there is one catholic priest who serves the catholic parishioners in the CDB area. The parish of St. Peter also celebrates the feast of St. Peter, also called the fisherman's feast, on June 29th each year. Colihaut commences their celebration the first week of St. Peter's, and Bioche and Dublanc stage their celebration one week after.

These communities are united by more than an annual celebration. Since Dublanc and Bioche are considered "sister" villages because of their close proximity, they share many of community facilities and institutions such as the credit union, post office, and village council. The Colihaut, Dublanc, and Bioche (CDB) area is also united as the same political and religious region. The political geography is such that the CDB consists of one constituency, in which all three communities are represented by one Parliamentary representative.

The CDB area also shares impressive natural resources. The Morne Diablotin National Park is a protected land area for the conservation of its biodiversity. Morne Diablotin is the largest mountain in Dominica at 4,747ft. and home to the most concentrated populations of Dominica's two indigenous, endangered parrots, the Sisserou and the Jaco. In addition to the forestry resources, the waters along the northwest coast are home to several species of whales and dolphins that migrate to the Caribbean.

2.1 **Village Councils**

In the CDB area, the communities are served by village councils. As the local government body in each village, each Council is responsible for community development and day-to-day village concerns. The Council seeks to improve the lives of its villagers through continued development of education opportunities, cultural experiences, and livelihoods support. The Council is also the intermediary between community members and central government, especially in terms of individual financial assistance and government funded community projects.

Each Village Council consists of eight councilors including a chairperson and is also served by a full-time clerk. Councilors are either elected or nominated and serve for three years. The sister communities of Bioche and Dublanc are served by a joint Council. The Councils organize many of the village activities including St. Peter's Festival, Green Ribbon Month, Eat Fish Day, sports days, holiday celebrations, and many more.

The village councils are important stakeholders regarding coastal resources. There are community members who are responsible for cleaning community gutters and maintaining the public convenience, and they are supervised by the councils. The Council Clerk and Chairperson are also key figures in enforcing quarry regulations. Both have authority to issue citations for any obvious violations such as

trucks driving without cover over their materials and lack of notice for blasting. The Colihaut Village Council has been especially proactive in ameliorating the situation in regards to nearby quarrying operations. After releasing a news brief in April 2009 about community concerns regarding the quarry, the Council was contacted by the Prime Minister and asked to attend a meeting that the Prime Minister would arrange with West Indies Aggregates proprietor Jacques Gaddarkhan and Minister of Housing, Lands, and Telecommunications Reginald Austrie. Since the news release, the Village Council has met with Gaddarkhan twice to discuss community concerns and quarry contributions to the village.

In addition to obligatory duties, the councils plan and execute projects for the general betterment of the community. The Colihaut Village Council is responsible for developing the Kashibona Trail/Eco-Tourism Project in the heights of Colihaut, and the Dublanc-Bioche Village Council partnered with the St. Peter's Fisheries Cooperative to assist with *Eat Fish Day* in 2007 and 2008 in Bioche and Dublanc respectively. Both of these projects center on sustainable use and promotion of local natural resources.

2.2 **St. Peter's Fisheries Cooperative**

The St. Peter's Fisheries Cooperative was founded thirteen years ago by two Bioche residents, Albert Phillip and Wallace Lewis. The Cooperative currently serves fishers in Colihaut, Dublanc, Bioche, and Coulibistrie with its headquarters building in Bioche. With thirty active members, the Cooperative seeks to unite local fishers for the betterment of the whole area. The Cooperative launched a series of "Eat Fish" initiatives in the CDB area in 2007, including *Eat Fish Day* and the *Eat Fish in Schools* program. *Eat Fish Day* is now an annual event on the national Independence calendar, and the *Eat Fish in Schools* program has spread island-wide to fourteen primary schools in some of the most impoverished areas. Most recently, the Cooperative has paired with International Fund for Animal Welfare (IFAW) to launch a locally-based whale watching project. IFAW developed CaribWhale, an association of existing whale watching organizations with the goal of promoting sustainable and responsible whale watching. The Cooperative is also a member of the National Fisheries Cooperative (NAFCOOP) which was recently established in the first quarter of 2008.

2.3 **Quarry Operators**

West Indies Aggregates (WIA) is the quarry operating immediately in the Colihaut community. Its activities occur only 91m from Colihaut homes. WIA is an international company based in Guadeloupe and its proprietor lives abroad. The Public Relations Officer, who functions as the community liaison in absence of the quarry proprietor, is originally from Colihaut but currently resides elsewhere in Dominica. Over the last few years, relations between the quarry and community are tenuous at best. The Colihaut Village Council claims that the quarry has not assisted the community despite their repeated requests for financial and material contributions towards projects and activities. Recently, the Council has met with quarry managers to ameliorate the situation and re-establish dialogue between the community and quarry. The quarry proprietor has agreed to fund the reconstruction of the Colihaut playing field which is located immediately next to the quarry.

Figure 2 RDR operates a quarry in Anse Cola, the area immediately south of Colihaut along the coastline.

There is an unsettling lack of information regarding the quarry's operations. For instance, the government's planning division does not have a copy of the quarry's requisite Environmental Impact Assessment as conducted prior to the quarry's inception. There is a quarry inspection committee that regularly visits the site to monitor compliance with quarrying regulations. The inspection committee comprises a local fisheries officer, forestry officer, member of the planning division, and key community members. The most recent inspection report admonished RDR quarry managers about a lack of dust control, oil containment, blasting notice, and covering around truck beds[5].

In 2007, the United States Agency for International Development (USAID) conducted a rapid assessment of the quarry impacts on marine and freshwater biodiversity in Dominica. For the Colihaut region, scientists concluded "this area represents an environment heavily impacted by quarrying."[6]

The quarry currently employs thirty Colihaut residents in positions ranging from administrative assistant to truck driver to machine operator. The quarry's annual production of material for 2009 is between 160,000 to 170,000 metric tons, the vast majority of which is exported to neighboring islands.[7]

There are two other quarrying operations in Colihaut's vicinity. RDR is the quarry operating at Anse Cola less than half a mile from the village, and PH Williams operating in Gabriel. Overall, Colihaut has an amicable working relationship with the RDR and PH Williams quarries. PH Williams sponsored the last Colihaut beach clean-up by contributing t-shirts and drinks for participants. The Colihaut Village Council lets RDR access one of its water pumps by the bayfront, and in return, the quarry sponsors village activities. Village Councilors and quarry employees were well represented in those community members surveyed.

3 METHODS

3.1 Data Topics

The study reveals a fairly comprehensive socio-economic profile for the primary user groups in the CDB area. These groups include fishers, community members, local government, a non-government organization (NGO), and nearby quarry operators. The fieldwork for this study was conducted from October to December, 2008 in the villages of Colihaut, Dublanc, and Bioche along the west coast of Dominica.

This assessment examined characteristics of user groups, characteristics of user group activities, users' perceptions of resource conditions/management, and users' perceptions of the quarry as outlined below.

> *Characteristics of User Groups:* the study determined basic demographic information of each user group such as age, sex, level of education, village of residence, income generation, number of children, household dynamics, and specific questions on health. For those respondents who were fishers, the survey asked more extensive questions regarding fishing practices, training,

[5] Rolle, Kelvin. Correspondence, "Subject: Quarry at Anse Cola, Colihaut." Government of the Commonwealth of Dominica: Ministry of Housing, Lands, Telecommunications, Energy and Ports. 13 March 2009.

[6] Findley, Meg. *Caribbean Open Trade Support: Rapid Assessment of Quarry Impacts on Marine and Freshwater Biodiversity in Dominica*. United States Agency for International Development. 12 December 2007.

[7] St. Louis, pers. communication.

catch, and equipment (Table 1).

Table 1: Number of Respondents According to User Group

User Group	Sub-group Representation	Total No. of Respondents per User Group
Fishers	St. Peter's Fisheries Cooperative	31 (2 Cooperative members)
Village Council		3
Past and Current Quarry Employees		19 (7 current)

Characteristics of User Group Activities: survey questions sought to determine community uses of coastal resources and the activities surrounding these resources (resources named include beaches, reefs, fisheries and marine life).

Users' Perceptions of Coastal Resources/Management: the study focused on users' perceptions of resource conditions over a fifteen-year span. Respondents gave their opinions on current resource management and the problems they believed to be affecting resources. Questions of user influence on the decision-making process/resource management also played an important role in determining stakeholder participation in resource management. Each community member surveyed also gave suggestions of which group should have resource management responsibilities and which group should solve resource problems.

Users' Perceptions of the Quarry: with quarry operators as a significant user group in the area, the study assessed perceptions of community members regarding quarrying and any positive or negative effects of quarrying on coastal resources. In an attempt to avoid bias, the survey asked general questions about respondents' perceptions of each natural resource (beaches, reefs, fisheries, marine life) over a timeline of fifteen years. The fifteen year point marked the inception of the quarry nearest to the village of Colihaut.

The general outline below of each group shows the disparities in resource use (Table 2). While the local fishers have a longstanding tradition of fishing for their livelihoods, community members typically use the beaches and other resources purely for recreation. On the other hand, there is the more recent development of quarrying operations in the area; West Indies Aggregate, the quarry in the village of Colihaut, is a foreign-run, privately-owned company. These vastly different user backgrounds and agenda have many implications for resource management.

Table 2: Resource Use According to Stakeholder Group

Study area activity or issue	Primary Stakeholder (and organization)	Secondary stakeholder (and organization)
Fishing	St. Peter's Cooperative National Fisheries Cooperative (NAFCOOP) Fishermen	Village Councils Boat Builders Fish Vendors Net Menders Fisher Helpers Consumers Schools

Study area activity or issue	Primary Stakeholder (and organization)	Secondary stakeholder (and organization)
		Fisheries Division Japanese International Cooperative Agency (JICA)
Agriculture	Farmers	Windward Islands Farmers Association (WINFA) Dominica Banana Producers Ltd (DBPL) Village Councils Ministry of Agriculture
Quarrying	West Indies Aggregates, Ltd. RDR Inc. PH Williams	Village Councils Builders Truckers Contractors Equipment Operators Employees Ministry of Mining
Construction	Homeowners	Builders Contractors Suppliers of Building Materials Ministry of Housing
Tourism	Tour guides Dive Companies IFAW (Whale Watching NGO) Tour Agencies Colihaut Bann Move	Tour guides Vendors Forestry Restaurants Shops Bus Drivers Ministry of Tourism/Discover Dominica Authority
Recreation/Culture	United Stars Sports Club Triumphs Colihaut Stone Blasters Dublanc/Bioche women's football team Colihaut women's rounders team Flamboyant cultural group Bioche cultural group	Community/spectators Ministry of Youth, Sports, and Culture

Adapted from: Pena (2008)

3.2 **Data Collection**

The data were collected primarily through a socio-economic survey developed specifically for the CDB area (Appendix 1). The information garnered from the survey is complemented by secondary information included in this document. Outputs of data analysis are provided in Appendix 2.

SocMon Survey (primary information): Interviews were the primary source of data collection and provided a basis by which the study could examine other information sources. Four enumerators from the CDB catchment area interviewed 130 households throughout the three villages. Enumerators visited every third house covering all areas in each village to provide a random 10% sample of households in each village. This method resulted in 70 interviews in Colihaut, 40 interviews in Dublanc, and 20

interviews in Bioche.

All four enumerators were residents of the CDB catchment area and thus already knowledgeable about user groups and existing coastal resource management. Rosette Lewis, who was responsible for the greatest numbers of surveys across all three villages, is a resident of Bioche and has much experience as an enumerator for the Fisheries Division. She has done extensive work with various community organizations including the village council and fisheries cooperative. Edward Victor is a resident of Dublanc and is currently a student at the Dominica State College. Althia St. Louis is a resident of Colihaut and has served as a village councilor for over four years. Rhiannan Price is a United States Peace Corps volunteer working with the Colihaut Village Council, the Colihaut Primary School, the St. Peter's Fisheries Cooperative, and other community-based organizations.

Document and Database Analysis (secondary information): Throughout the monitoring process, secondary data provided the scope for writing the survey and also the framework for analyzing survey results. Documents reviewed included government reports and records (Fisheries Industry Census, FAO Reports, UN Reports, Biodiversity Research, Local Health Reports, etc), non-government organization research, and private sector information (quarrying reports, mining statistics, and employment).

4 RESULTS AND DISCUSSION

4.1 Socioeconomic Impacts of Development

The development in the Colihaut, Dublanc and Bioche area is limited to fishing, quarrying, recreation, and a potential whale watching operation. Although eco-tourism is the new priority island-wide, it is just developing in the CDB area with the inception of the Kashibona Trail and possible whale watching community-based enterprise. The diversity of development has caused user conflicts that have endangered livelihoods and allowed unsustainable coastal management practices. This coastal development also emphasizes a shift from cultural to economic values for resources.

4.2 Community Members

Of the 130 persons interviewed, greater than 75% were community members who were not fishers (Figure 3). Across the Colihaut, Dublanc, and Bioche communities, there are approximately 1,300 households. These community members are employed primarily in the service and construction industries and the public sector (see Table 3).

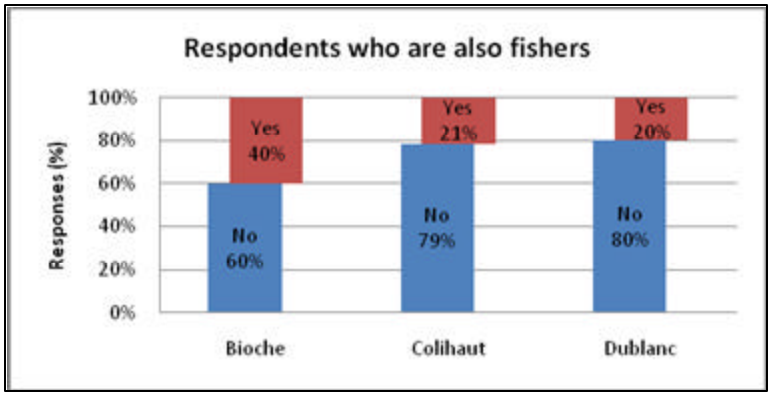

Figure 3 Respondents who are also fishers.

Some community members (approximately 37%) diversify their work and have a secondary income, the most popular being farming and construction (47% and 27% respectively). In Colihaut, many families (27%) reported remittances as a part of their income. Remittances are common throughout Dominica as 55% of

households have at least one close family member (spouse, child, parent or sibling) living overseas.[8]

The vast majority of persons interviewed were Roman Catholic. 57% of community members interviewed are single while 34% are married. There were almost an equal number of men and women interviewed; 48% interviewed were female, and 52% were male. Most persons in the Colihaut, Dublanc and Bioche communities have only a primary school education. Only 30% had received education beyond primary school, a significant proportion of which completed a secondary school education (66.6%). Across all three villages, 10% of persons had some sort of tertiary education including Dominica State College and universities abroad.

Table 3 Primary incomes of income

Primary income	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Administrative	4%	8%	13%	8%
Construction	24%	25%	4%	20%
Farming	0%	14%	9%	9%
Fishing	16%	4%	9%	8%
Medical	0%	4%	0%	2%
Public Sector	12%	10%	17%	12%
Retired	4%	10%	4%	7%
Service	32%	20%	17%	22%
Unemployed	8%	6%	26%	11%
Grand Total	**100%**	**100%**	**100%**	**100%**

In general, based on the survey results, persons from Bioche are less likely to achieve a secondary and tertiary education (5% each) than those in Colihaut and Dublanc (13% and 8% respectively). Colihaut is a wealthier village, and the overall population is more educated than Bioche and Dublanc.

The average household size for all three villages was 3.2 with Bioche as the highest with an average household size of 3.6 persons. Of all persons surveyed, 62% answered that they were unsatisfied with their standard of living. This dissatisfaction was found across all ages, religions, incomes, and gender. Most persons do not belong to any type of community-based organizations (71%), and of those that are involved, church groups (9%) such as youth groups, choirs, prayer groups, and women's groups are the most popular.

4.3 **Fishing Practices**

Of the majority of fishers interviewed, only 55% fish full-time. The majority of fishers, both full-time and part-time, are registered with the Fisheries Division (68% of respondents) with the highest proportion of full-time registered fishers (87.5%) occurring in Dublanc. All full-time fishers in Colihaut and Dublanc are registered, whereas only one quarter of full-time fishers are registered in Bioche. Colihaut, followed by Bioche have the highest proportions of part-time fishers across all three villages (60% and 50%, respectively) whereas Dublanc has the smallest proportions (12.5%). In general, lack of registration by part-time fishers is significantly higher than that of full-time fishers (29% and 3.2%, respectively). Some fishers have undertaken training offered by the Fisheries Division. The majority of respondents from Dublanc (88%) have taken advantage of these training programs, the most popular of which include safety at sea; fish handling and quality; fish aggregating devices (FADs); fishing gear and methods; and navigation.

Most fishers have another form of income, often from other fishing-related activities. All fishers in the CDB area report having at least ten years fishing experience, with the majority having between 20 and 29 years experience (Table 4). The vast majority of fishers have only a primary school education; this

[8] *Caribbean Development Bank Commonwealth of Dominica Country Poverty Assessment*: *Final Report, Vol. 1*. Halcrow Group Ltd in association with Decision Economics, Willms and Shier, DPU University College London, and The National Assessment Team of Dominica. June 2003.

group also exhibits a strong aversion to meetings.

Table 4 Experience of fishers

Years Fishing	Community			Grand Total
	Bioche	Colihaut	Dublanc	
10-19	0%	20%	38%	19%
20-29	50%	33%	38%	39%
30-39	38%	27%	0%	23%
40-49	13%	20%	25%	19%
Grand Total	**100%**	**100%**	**100%**	**100%**

Dublanc fishers fish more frequently than those in Colihaut and Bioche during the peak fishing season with most fishers (63%) fishing six days per week. This frequency of fishing expeditions parallels the apparent higher demand for fish in the Dublanc community with persons eating fish an average of four times a week. In general across all three communities, the majority of respondents (22%) noted they eat fish three times per week (Table 5). During the fishing off-season, greater than half of the fishers (56%) interviewed stated that fishing occurred twice per week. Fishers in the CDB area report no problems selling their fish. This claim is supported by a high demand for fish island-wide and the fact that generally small amounts of fish in terms of value, between EC$10-29, are given away free by fishers. Dominica is forced to import fish to meet demands.

Table 5 Frequency of eating fish per week

Days eating fish weekly	Community			Grand Total
	Bioche	Colihaut	Dublanc	
0	0%	1%	0%	1%
1	11%	20%	5%	14%
2	26%	13%	5%	12%
3	26%	20%	23%	22%
4	11%	21%	18%	19%
5	21%	3%	38%	16%
6	5%	3%	3%	3%
7	0%	19%	10%	13%
Grand Total	**100%**	**100%**	**100%**	**100%**

Colihaut is marked by a drastic shift away from traditional livelihoods such as fishing with more and more community members working outside their villages primarily in the construction and service industries (20.3% and 36.2% respectively). In Bioche and Dublanc, fishing is still a dominant source of income.

Of those interviewed, the overwhelming majority of fishers (69%) reported a decline in fish catch over the last fifteen years with fishers noting smaller fish size, change in species caught and farther fishing grounds (Table 6).

Table 6 Change in fish catch since 1993

Trend	Community			Grand Total
	Bioche	Colihaut	Dublanc	
It has been increasing	14%	20%	43%	24%
It has remained stable	14%	0%	14%	7%
It has been decreasing	71%	80%	43%	69%
Grand Total	**100%**	**100%**	**100%**	**100%**

Of the remaining 31% who saw an increase or no change at all in fish catch, some credited the use of Fish Aggregating Devices (FADs) for their stable fish catch. With FAD fishing and the general trend of fishing farther out at sea, there is a greater risk of losing life and equipment to inclement weather, piracy or poor navigation. According to the National Fisheries Census, each fisher owns an average of 18 pots. Considering the limited shelf size available for use of such gear; the great losses of pots which occur annually due to storms and hurricanes; the observed decline in the demersal fishery from catch data and reef habitat degradation being caused by quarry operations; and other land based activities, the

number of pots deployed in this fishery is cause for concern. The ongoing ghost fishing study being conducted by the Fisheries Division and Japan International Cooperation Agency (JICA) has shown that fish pots can continue to ghost fish for at least 14 months after they are lost. Eighteen pots per fisher is a significant statistic, and ghost fishing must therefore be a consideration in coastal management strategies.

4.4 Effects of Nearby Quarrying

The silt, apparently from quarry operations, that covers fish habitats near shore is ruining the livelihoods of those fishers who do not have access to technology like FADs. Although there is a sea wall spanning the coastline immediately south of Colihaut, there are no groynes or other structures that could be displacing such large quantities of sediment. One of the quarry operators, PH Williams, in Anse Cola stockpiles materials by the dock to be loaded onto the barge. Loose materials could escape from uncovered truck beds and the stockpiles area, especially during inclement weather, into the sea only a few yards away. The west coast was traditionally known for its coastal pelagic fishery. The jacks, mackerals and scads caught by seine nets have significantly declined from landings over the years. Local fishers have attributed this decline to the destruction of the coastal habitat by land based sources such as quarries.

Community members do not see the area as having resources to be capitalized on because they witness the deteriorating conditions. However, they accept the silt beach which was recently created, covering the once stony shoreline. The overall perception of Colihaut's new beach is that it seems to be an unnatural phenomenon created by sedimentation returning ashore. During Hurricane Omar in September 2008, vast amounts of silt and sand were brought ashore covering the entire bayfront road of the village. The community, however, has taken advantage of its newly created beach for recreation purposes. For example, the community had a beach fete on August Monday as part of the national holiday celebrations.

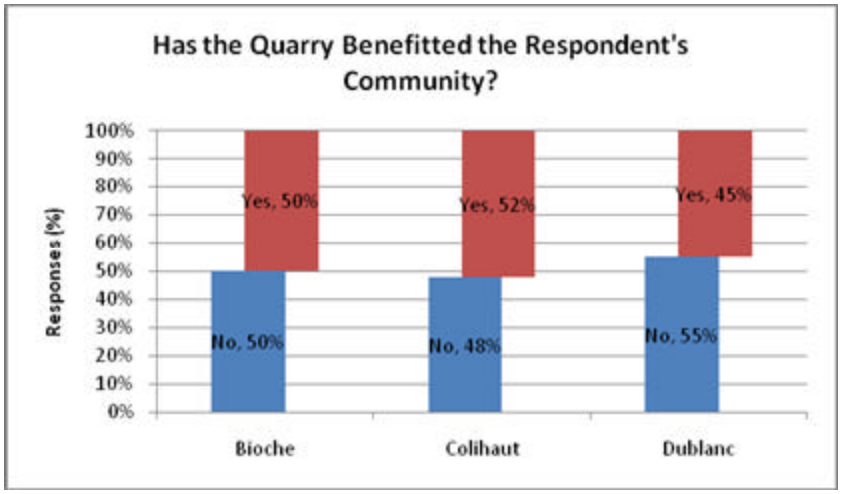

Figure4 Respondents who believe that the quarry has benefited the community.

Overall, community members are divided as to whether the quarrying operations are justified to the communities. Across all three villages, approximately half of respondents said the quarry did benefit the community and half said the quarry did not benefit the community (Figure 4). Of those persons surveyed who believed the quarry benefited the community (about half of respondents), 90% mentioned access to materials and employment as benefits. The overwhelming majority of respondents in Bioche and Dublanc cited access to material as the primary benefit of the quarry to the community. This surprisingly was not the main benefit noted by respondents of Colihaut; only one fifth cited access to materials as a benefit. Of the three villages, Colihaut benefits the most from employment with thirty Colihans working at the quarry. 68% of respondents cited employment as a

benefit of the quarry being in Colihaut (Table 7).

Table 7 Ways in which respondents believe the quarry has benefited the community

	Community			
Benefit	**Bioche**	**Colihaut**	**Dublanc**	**Grand Total**
Access to materials	91%	20%	83%	47%
Employment	9%	68%	6%	43%
Sponsor community projects	0%	10%	11%	9%
Support local shops	0%	2%	0%	1%
Grand Total	**100%**	**100%**	**100%**	**100%**

Although the quarry employs thirty village residents, these livelihoods do not necessarily compensate for the loss of fishing, environmental degradation, damaged infrastructure, and health concerns. Despite villagers' alarm at these issues, there is little evidence directly linking quarrying operations to resource problems.

Those community members who claimed the quarry provides no benefit to nearby communities cited a variety of reasons. The vast majority (81% respondents) asserted that the quarry does not give any assistance to the community. Other reasons cited include health concerns regarding the dust and blasting (16.4%), environmental degradation (14.8%) and damages to infrastructure (11.5%). In a meeting with the Colihaut Village Council, Jacques Gaddarkhan, Manager of the West Indies Aggregates Company, addressed these complaints. Regarding the oil spills and waste materials, Gaddarkhan informed the Council that WIA built a catchment to control spills entering the river.[9] He also stated that mechanisms have been put in place to control the dust problem. As for infrastructure damages, Gaddarkhan noted that most Colihaut residents build without planning permission with faulty foundation and then blame cracks on the quarry's blasting. Despite this claim, Gaddarkhan promised to meet with any persons who still have complaints and have a copy of the planning permit for their residence. To address the major concern of assistance to the community, Gaddarkhan pointed out several projects undertaken by WIA in the Colihaut community such as renovation of the primary school, construction of village roads, contributions of materials, and financial contributions towards the village feast and Carnival.

4.5 **Cultural Value of Coastal Resources**

The St. Peter's Festival is a cultural celebration of the community's fishing heritage. Community members, however, will explain that the vibrancy of the weekend has been steadily declining in recent years with little to no collaboration among the three villages for the Festival although all three celebrate it in the same two-week span. This could be attributed to a lessening inter-connectedness among villages. The three villages used to share a single Catholic Church based in Colihaut, but since Dublanc now has its own Catholic Church, villagers worship separately except for special religious services when all join together.

There seems to be a shift from the traditional cultural value in fishing to a more economic-valued approach. This shift could be attributed to a variety of factors including continued government subsidies in the fishing sector; quarrying operations undermining fishing practices; and new income generating opportunities for youth.

Colihaut is beginning to exist almost independent of the coastal resources. The community currently has an ongoing eco-tourist project in the heights of Colihaut at Kashibona Lake. The Village Council,

[9] Langlais, Gislyn. "Special Meeting of the Colihaut Village Council and Mr. Jacques Gaddarkhan, Manager, West Indies Aggregates Company." Meeting Minutes. 12 May 2009. Colihaut Village Council Office.

which was responsible for writing the grant prosposal and developing the trail, is thus willing to capitalize on its natural resources. However, the community as a whole seems complacent about the conditions of its bayfront. Most resource management decisions originate from the local government. When villagers' livelihoods are not in question, there is little concern over natural resources. For example, most villagers are content with the new beach that has been created possibly as a result of quarry sedimentation.

However, fishers, whose livelihoods are directly impacted by the sedimentation, are not satisfied with the new beach phenomenon. Despite the economic hardships of a decreasing fish catch, there is still what locals call a "coudemere," or altruistic, spirit surrounding fishing. Almost 100% of fishers give some of their catch away for free at the landing site. The catch given away ranges from less than EC$10 to greater than EC$200 (Table 8). According to the National Fisheries Census, fishers give away an average of 12% of their catch.[10]

Table 8 The value of fish given away free by fisheries

Value of Fish (EC$)	Community			
	Bioche	Colihaut	Dublanc	Grand Total
<10	0%	21%	0%	10%
10-29	50%	21%	25%	30%
30-49	25%	7%	25%	17%
50-69	25%	14%	13%	17%
70-89	0%	14%	13%	10%
90-109	0%	14%	13%	10%
110-129	0%	0%	13%	3%
190-209	0%	7%	0%	3%
Grand Total	**100%**	**100%**	**100%**	**100%**

4.6 Disaster Relief Assistance

As noted in the International Monetary Fund's (IMF) country report on Dominica, the currency union between the Eastern Caribbean Dollar and the US dollar makes the Dominican economy more susceptible to external shocks, including natural disasters. Small island states are particularly vulnerable to economic shocks and natural disasters.[11] As noted in the "Commonwealth Vulnerability Index for Developing Countries," of 111 countries evaluated, Dominica had the sixth most vulnerable economy to shocks and natural disasters in the world and the most vulnerable in the Caribbean.[12]

Figure 5 In Colihaut, fishers struggled to properly secure their boats and equipment from the flooding and sea swells of Hurricane Omar

Due to their considerable impact on the island's economy and livelihoods, natural disasters necessitate support for

[10] "Fisheries Industry Census of Dominica 2008." Ministry of Agriculture, Fisheries and Forestry. Government of the Commonwealth of Dominica.

[11] IMF, *Dominica: Recent Economic Developments, Country Report No. 01/104*, 2001

[12] Atkins, Jonathan P., Sonia Mazzi, Christopher D. Easter. *A Commonwealth Vulnerability Index for Developing Countries*. United Nations Commonwealth Secretariat.

those most affected. Disaster relief funding has a great influence on the fisheries sector. After a storm surge or hurricane, the government sends its field officers to assess damages and report fishers' losses. With this information, the government gives both financial assistance and new equipment to those who have suffered the worst losses.

The government, particularly the Minister for Agriculture, Fisheries and Forestry, has made disaster relief funding a great priority to ensure food security and the livelihoods of those fishers and farmers affected. In this regard, government approved four million dollars (EC$4,000,000) following Hurricane Omar in September 2008 to bring relief to fishermen for the replacement of fishing equipment, boats and boat sheds. Direct cash assistance of EC$18,295 was also provided to fishers of Colihaut, and fishers in Bioche and Dublanc received EC$32,850. These fishermen were affected by heavy sea swells in September 2008.[13] On March 27, 2009 the Government of Dominica presented two fishers from Colihaut with new fibreglass boats.[14]

In addition to new fiberglass boats, the Government also provided over 60 engines and fish pot wire to 110 fishers in addition to fishing tackle, life jackets and other equipment in order to provide them with all the necessary tools to return to fishing. Although the government ordered fiberglass boats from Colombia, it also signed 27 contracts with boat builders to build 80 boats and to repair 53 boats at a total cost of EC$852,305.00. To date, 65 boats have been delivered to the fishermen of the west coast to enable them to resume their fishing operations.[15]

With many of the sea swells, fishers have little to no warning and are unable to secure their equipment and boats. A lack of secure facilities at landing sites across the island is also an issue. There are simply not enough storage areas to protect equipment and boats during inclement weather.

The heavy subsidies for fishers are problematic for several reasons. Fishers now expect monies from government after inclement weather, and this new paradigm is creating a dependency. There is also a huge partisan influence on who receives monies and who does not. Many fishers complain that only those who support the current administration receive help. This is a major flaw in the disaster relief process. Many persons who receive subsidies do not fish as their primary occupation. Another problem is that fishers have been known to misrepresent their actual losses. The process used to determine who receives monies is inherently flawed.

All of these issues were evident and major topics of discussion during and after this survey. Many of the fishers surveyed for this socio-economic assessment thought that they would receive assistance as a result. Despite explanations that the survey was purely for informational purposes and had nothing to do with assistance for fishermen, fishers still approached the enumerators months later asking if they would receive any monies or equipment. This mindset is indicative of the larger problem of dependency that is being enabled by government subsidies.

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13 Joseph, Emmanuel H. "Government Provides Relief for fishermen affected by Hurricane Omar." http://www.dominica.gov.dm/cms/index.php?q=node/700 (accessed 28 April 2009).

14 Ibid.

15 Ibid.

4.7 Religion

In general, membership of community organizations or groups is low among all villages with between 18-33% of the respondents affiliated with a community group. The community-based organizations with the most participants are the local church groups (9% of respondents belonged to church groups). These groups are largely attended by women and youth. However, some Village Councilors complain that these religious groups do not participate in community activities such as National Community Day of Service, fundraisers, or other community-based initiatives; instead, church-goers are primarily involved in church activities and fundraisers.

5 STAKEHOLDER AWARENESS OF IMPORTANCE OF RESOURCE BASE

The various stakeholders, community members, fishers, village councils, and quarries, have differing awareness levels and priorities in terms of coastal resource conditions and use. Often, this awareness is linked to the stakeholders' participation in community activities and organizations and their socio-economic status.

5.1 Community Perceptions of Coastal Resources

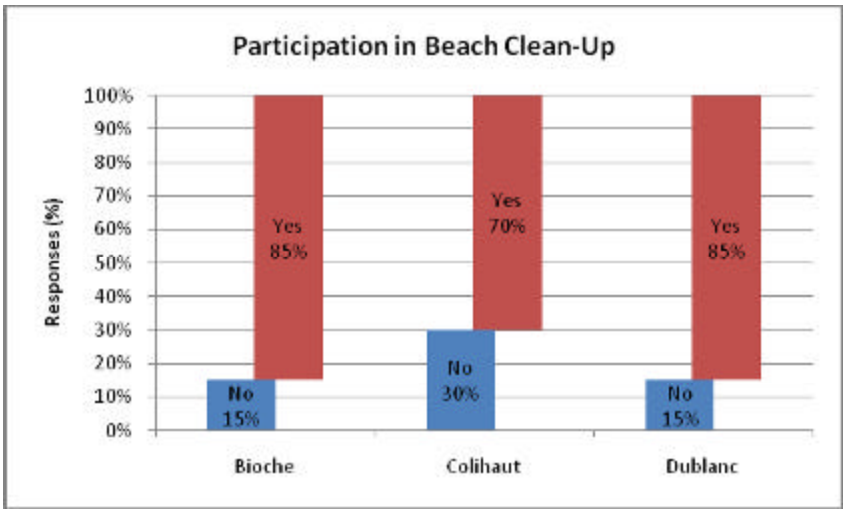

Figure 6 Community participation in beach clean-ups.

There is an ingrained understanding in each community that it is "very important" to keep the environment clean. This understanding has prompted a high participation in community beach clean-up campaigns. Approximately 77% of residents interviewed had participated in beach clean-ups in the villages, with the lowest participation rate in Colihaut (70%) and Bioche and Dublanc both with 85% participation (Figure 6). Participation in clean-ups appears to be community specific with little participation from residents in neighboring villages.

In the past two years, Colihaut has held two community-wide beach clean-ups. Both of these efforts were organized through the school as part of the launching of the *Eat Fish in Schools* program and as part of the Green Ribbon Month environmental activities. Although these are community-wide clean-ups, other community groups, such as the Girl Guides and church youth groups, have conducted their own community clean-ups as part of National Community Service Day. Bioche and Dublanc also conduct clean-up campaigns twice a year, and both of these

Figure 7 Colihaut primary students and JICA volunteers help with a beach clean-up.

campaigns are organized by secular youth groups. Young persons, especially primary school students, are the most enthusiastic participants in these clean-ups. With their participation in community-based organizations and activities such as clean-ups, the youth should be considered an important stakeholder group in managing coastal resources.

Across the three communities, those interviewed identified the following problems regarding coastal resources: bad quarrying practices (21.6% respondents), destruction of resources (24.3%) and poor sanitation practices (38.1%) (Table 9). In terms of bad quarrying practices, respondents cited blasting, chemical use, oil and waste run-off and sedimentation as problems. Fishers almost always identified decline in fish catch as the greatest problem resulting from destruction of coastal resources. Destruction of resources also included deforestation, erosion, flooding, pollution, and, more specifically, the destruction of the coral reefs. Under the umbrella of poor sanitation practices, community members named problems like human waste, improper disposal of garbage and littering. Across Dominica, 60% of west coast communities do not have an approved form of sewage disposal.

Table 9 Main problems regarding resources in CDB area

	Community			
Problems	**Bioche**	**Colihaut**	**Dublanc**	**Grand Total**
Bad fishing practises	4.5%	2.1%	12.0%	4.6%
Bad quarry practises	40.9%	21.9%	12.0%	21.6%
Coastal erosion	4.5%	3.4%	8.0%	4.6%
Destruction of resources	13.6%	30.1%	12.0%	24.3%
Poor sanitation practises	36.4%	34.2%	50.0%	38.1%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Only 55% of the population is served by a communal solid waste collection and disposal system.[16] Although everyone in each community answered that it is "very important" to keep the environment clean, poor sanitation is still cited as a major problem affecting coastal resources. This prompts the conclusion that awareness does not necessarily translate into behavioral change.

When asked to offer solutions to the problems affecting coastal resources, the majority of respondents wanted more education and training opportunities (18.1%). Other suggestions included improving the monitoring and regulation of the quarries (17.4%) and improving sanitation practices (15.5%).

The communities perceive their coastal resources to have deteriorated over the last ten years. Although most residents believe the resources were generally in good condition in 1998, they now observe them to be worsening. Currently, the majority of residents perceive their natural resources to be in "bad" or "very bad" condition. Overall, the majority of respondents believe that out of all coastal resources, fisheries and marine life (66% and 64% respectively) are in the poorest state, i.e. in either a bad or very bad condition. Over half of the respondents believe the beaches and reefs are also in a bad or very bad condition. With respect to beach condition, the majority of people surveyed in Colihaut thought that the beach there was in good condition (37% of respondents).

5.2 Water and Air Quality

In all three communities, 76% of respondents noticed a change in water quality over the last fifteen years. However, the change noticed was negative for all responses. In Colihaut and Bioche, the

[16] *Caribbean Development Bank Commonwealth of Dominica Country Poverty Assessment*: *Final Report, Vol. 1*. Halcrow Group Ltd in association with Decision Economics, Willms and Shier, DPU University College London, and The National Assessment Team of Dominica. June 2003.

overwhelming majority of respondents (90% and 70%, respectively) noticed a negative change in water quality, whereas just over half of Dublanc respondents noticed a negative change. The main perception regarding water quality was that drinking water is often discolored and dirty. Only a minority of respondents thought that the changes in water quality were due to low water pressure and unavailability of the resource (Table 10).

Table 10 Perceived changes in water quality

Water quality perceptions	Communities			
	Bioche	Colihaut	Dublanc	Grand Total
Causes illness	0.0%	1.6%	4.5%	2.1%
Heavily chlorinated	0.0%	1.6%	0.0%	1.0%
Low water pressure and levels	25.0%	0.0%	9.1%	5.2%
Unavailability of water	0.0%	3.2%	9.1%	4.2%
Water is dirty	75.0%	93.5%	77.3%	87.5%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The government has acknowledged the complaints of CDB residents. In the 2008-2009 Budget Address, the Prime Minister stated that European Union funds had been earmarked for a feasibility study for a new west coast water supply system.

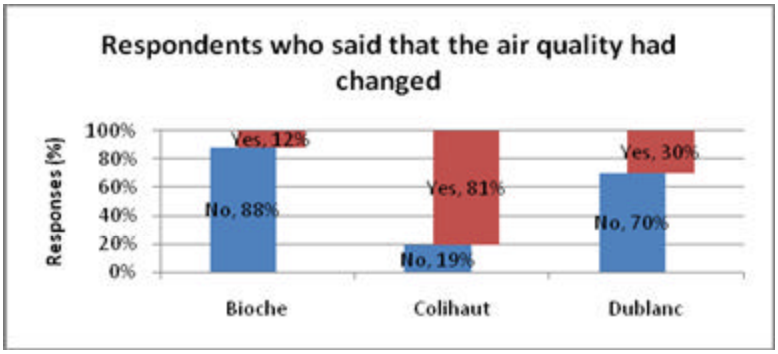

Figure 8 Perceived change in air quality

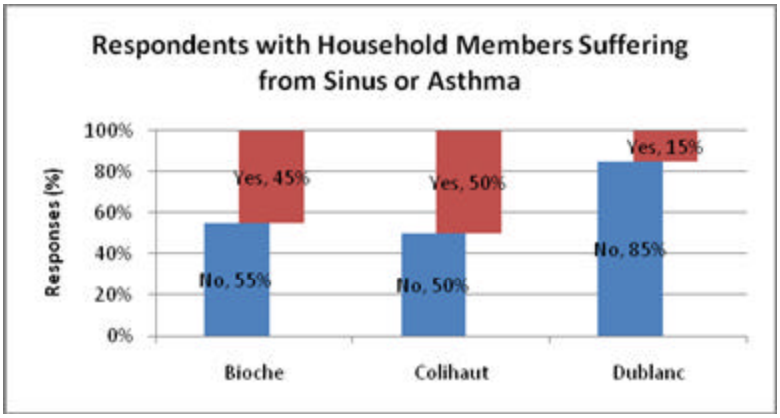

Figure 9 Percentage of respondents suffering from asthma or sinus problems

Although there were similar responses regarding water quality across all three communities, there was not a consensus regarding air quality. About 81% of Colihaut respondents noticed a change in air quality over the 15 years, whereas only fairly small percentages in Dublanc and Bioche (30% and 12%, respectively) observed any change (Figure 8). All respondents in Bioche and 91% in Colihaut thought that the air was dirtier today than 15 years ago. Almost all Colihaut interviewees complained of the dust, with some attributing the dust problems to the nearby quarrying operations and blasting. However, across all three villages, illness associated with negative changes in air quality was not significant. Half of Colihaut persons interviewed claimed that someone in their household suffers from sinus problems or asthma (Figure 9). When asked to corroborate this statistic, the Colihaut nurse asserted that Colihaut does not suffer from greater numbers of sinus problems or asthma than other communities around the island. In Bioche, 45% of interviewees suffer with asthma or sinus problems; however, in Dublanc, only 15% suffer from asthma or sinus problems (Figure 9).

6 STAKEHOLDER PARTICIPATION IN DECISION-MAKING

Villages like Colihaut, Bioche and Dublanc are traditionally tight-knit communities with active residents. However, according to the *Dominica Country Poverty Assessment*, increasing socio-economic disparities, delinquency and drug abuse have eroded the cohesiveness of Dominican communities.[17] There is a growing reluctance to participate in community activities, and increased commuting to Roseau is also reducing the richness of village life and turning our communities into dormant residences.

This decline in community cohesiveness is evidenced by the responses in this survey. Only two of 31 fishers interviewed are members of the regions' fisheries cooperative. On the whole, 72% of respondents did not belong to any community group. This prompts the conclusion that the vast majority of the CDB population has very little ownership in community activities and development.

However, the overwhelming majority of respondents (71%) indicated that they did have influence on management decisions with regards to resource management. The majority at 60% feel they have little to some influence, and only 11% feel they have much very much influence on management decisions. Of community residents surveyed, 29% feel they have no influence whatsoever on management decisions (Table 11); however, about half of the respondents from Dublanc felt they had no influence at all.

Table 11 Perceived influence on resource management

Perceived influence	Community			Grand Total
	Bioche	Colihaut	Dublanc	
No influence at all	50%	27%	23%	29%
Little influence	35%	27%	30%	29%
Some influence	15%	33%	35%	31%
Much influence	0%	7%	10%	7%
Very much influence	0%	6%	3%	4%
Grand Total	**100%**	**100%**	**100%**	**100%**

Most community members declare that the government should be the decision-maker for resource management (60%); thus power is very much centralized to these government agencies. Of all three communities, Colihaut appears to have the least support for government agencies (43% whereas 85% and 70% of respondents in Dublanc and Bioche have high confidence in government agencies) and the most support for local government (30% as opposed to 8% and 15% in Dublanc and Bioche, respectively) as the decision-makers for resource management (Table 12).

Table 12 Responsibility for decision-making

Decision maker for resource management	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Community in general	10%	14%	5%	11%
Don't know	5%	1%	0%	2%
Fishermen, boat operators and resource users	0%	7%	3%	5%
Government Agencies	70%	43%	85%	60%
Local Government	15%	30%	8%	21%
Nearby Quarry Operators	0%	3%	0%	2%
Special Committee	0%	1%	0%	1%
Grand Total	**100%**	**100%**	**100%**	**100%**

This support for local government in Colihaut could be a result of the proactive measures taken by the Village Council to develop the Kashibona Trail, initiate Green Ribbon Month, and

[17] *Caribbean Development Bank Commonwealth of Dominica Country Poverty Assessment*: *Final Report, Vol. 1*. Halcrow Group Ltd in association with Decision Economics, Willms and Shier, DPU University College London, and The National Assessment Team of Dominica. June 2003.

address environmental concerns regarding the quarry. However, respondents decided that responsibility for these resources should be more equitably shared with 71% of respondents believing that the community in general has to take responsibility as well as government. Community and government were primarily identified as responsible for resources, but in Colihaut, respondents named user groups like the quarry, fishers, and boat operators as another population with much responsibility towards managing resources. Historically, community members are content to allow government to make decisions surrounding coastal resources. Even community-based initiatives like the Eat Fish programs are greatly supported by central government, in this case by the Fisheries Division, for assistance. This trend could be attributed to the fact that the central government has much of the technical and financial resources that are needed to sustain such large projects.

Community members believe that the quarry should be regulated (84% of respondents). As for quarry regulation, 49% chose government agencies as responsible for regulation. In Colihaut, about a third of respondents answered that community members and a special committee should also be involved in quarry regulation.

6.1 Village Councils' Role

The Colihaut Village Council is particularly aware of environmental concerns and issues. Knowing that there was an ongoing socio-economic monitoring project in the community, the Council requested a preliminary meeting with our SocMon committee to discuss the results, particularly those pertaining to the quarry.

The Council has also been proactive in sponsoring environmental programs. In particular, the Council organized National Green Ribbon Month in January 2009, a month of environmentally focused activities including an opening ceremony, school environmental day, a community hike to Kashibona Lake, an environmental workshop, and a culminating environmental exhibition. The school day and hike were both very successful. During the school day, local environmental activists showed the children how to build a compost pile, and thereafter, many parents in Colihaut built their own. This demonstrates the power of children and their schools as media of communication to the parents and community as a whole. The hike was well attended, and despite minimal advertisement, it brought hikers from all over the island. Community members were enthusiastic, and many requested another hike in the future. Unfortunately, the workshop and exhibition were not as well-attended.

6.2 Demand for Fish and the "Eat Fish" Awareness Campaign

In an attempt to raise awareness about the benefits of eating fish, the St. Peter's Fisheries Cooperative collaborated with the Fisheries Division on two major initiatives. The first, aptly named *Eat Fish Day*, is an annual event held immediately after Independence activities on the first Sunday of November. The first annual *Eat Fish Day* was November 9, 2007 in Bioche, and it served fish to hundreds of patrons. The Cooperative held the second annual *Eat Fish Day* in Dublanc with an increased operating budget of EC$60,000 for a crowd of over a thousand patrons. The goal of the event is to inform the public of the health and

Figure 10 Venezuelan Chef Pablo Yepez cooked some of his native fish cuisine for locals at Eat Fish Day 2008 in Dublanc

economic benefits of eating local fish. *Eat Fish Day* also prompts patrons to sample a variety of foreign culinary styles from Japanese sushi to American grilled fish to German gulash. Of the 130 persons surveyed across the three villages, just over half (52%) had attended *Eat Fish Day*. Overall support for the Eat Fish Day events appears to be greater in Bioche and Dublanc with greater numbers of respondent attendance (90% and 40% respectively) than in Colihaut. This may be due to the fact that these events have been held in these villages and one has not yet been held in Colihaut.

The Cooperative's second initiative is the *Eat Fish in Schools* program. This program seeks to educate primary school children about the benefits of eating fish by sponsoring a healthy fish lunch once a month. The Cooperative launched the program in Dublanc and Colihaut in February and March of 2008. The initiative spread quickly, and over the next four months, twelve schools joined Dublanc and Colihaut to participate in the fish feeding program. Approximately 1,527 students in some of the poorest communities across the island ate a healthy fish lunch once a month as a result of this program. 38% of respondents noted that their children participated in the *Eat Fish in Schools* program (Table 13). Of these, 96% claimed that their child/children benefited from an increase in awareness from the *Eat Fish in Schools* program, and 64% thought their children experienced a "big increase" in awareness about the benefits of eating local fish. Only 4% of respondents felt their child/children had "no increase" in awareness. Owing to the significant increases in children's awareness, the overall aim of the *Eat Fish in Schools* program seems to have been achieved (Table 13).

Figure 11 Colihaut student Beyonce George enjoys a fish lunch through the Eat Fish in Schools program

Table 13 Children's awareness of health benefits of eating fish after participating in the Eat Fish in Schools Program

Eat-Fish Day Increase Awareness?	Community			
	Bioche	Colihaut	Dublanc	Grand Total
No increase at all	0%	7%	0%	4%
Little increase in awareness	40%	7%	17%	16%
Some increase in awareness	20%	14%	17%	16%
Big increase in awareness	40%	71%	67%	64%
Grand Total	**100%**	**100%**	**100%**	**100%**

The *Eat Fish in Schools* program partnered with local fishers to provide fresh, high quality fish to the primary schoolchildren for a reduced price. Parents were another obvious stakeholder group contributing fruits, vegetables, ground provisions, and seasoning as well as cooking the lunches for that day. Unfortunately, due to a lack of funding to cover fish costs, the program has not continued into the 2008-2009 school year.

Although there is no comparative data, trends in fish consumption across the CDB area could be attributed to the strong "Eat Fish" campaign. Many residents of Colihaut, Bioche, and Dublanc eat fish numerous times each week. For Colihaut and Bioche, persons eat fish an average of three to four times a week, whereas Dublanc residents report a higher consumption of fish, averaging just over four times a week.

7 DEMANDS FOR ALTERNATIVE LIVELIHOODS

Although Colihaut, Bioche and Dublanc participate in the Eat Fish programs and the occasional beach clean-up, the typical uses for its coastal resources among these three communities are confined to

recreation and fishing-related activities. Specified activities included bathing, boating, cleaning, fishing, picnics, and swimming.

Community members do not view coastal resources as an opportunity to generate income. Of 61 income-generating aspirations offered by community members, only nine, used or focused on marine resources. The scope of these nine was also very much focused on fishing-related activities like boat building, fish farms, and fishing itself. There were only two exceptions: one respondent aspired to start a ferry service, and another wanted to be involved in eco-tourism. It seems that residents do not view their beaches, rivers, sea, and fisheries as assets to be cultivated, and the opportunities they do notice are generally focused on traditional activities like fishing.

Of the remaining 52 aspirations, 30 focused on the service industry with suggestions of opening shops, bars, hair salons, and music stores. These aspirations were tied to existing personal skills rather than surrounding resources. It is also important to note that 60% of respondents offered no alternative income-generating aspirations.

Even though the general community does not perceive its coastal resources as opportunities for income generation, outside organizations have plans for development in the CDB area. After establishing CaribWhale, an association of whale watching operators in the Caribbean, the International Fund for Animal Welfare (IFAW) is planning to launch a locally based whale watching initiative in the CDB area to stimulate income generation. IFAW has been liaising with the St. Peter's Fisheries Cooperative for over a year to begin preparation for the whale watching initiative and solicit community involvement. The goal of this project is to establish sustainable and responsible whale watching in various countries across the Caribbean. CaribWhale members include existing whale watching operators as well as tourism and hotel associations, fisheries cooperatives, academic institutions, and scientists. In addition to promoting sustainable whale watching businesses, CaribWhale will support community endeavors such as educational programs, community participation, and advocacy.

In addition to this whale watching project, the Kashibona Trail is another recent development using natural resources for income generation. With the inception of the new eco-tourist site at Kashibona and the upcoming whale-watching initiative[18], the communities will hopefully gain a heightened appreciation of the income possibilities surrounding their natural resources.[19]

8 VALIDATION MEETINGS

In order to provide feedback to the communities as well to confirm the data collected, validation meetings were held in each of the three communities studied – Dublanc (21 July 2009), Bioche (22 July 2009) and Colihaut (6 August 2009). The findings of the assessment were largely validated.

9 RECOMMENDATIONS FOR MANAGEMENT

Based on survey results, secondary information, and key informant information, the following recommendations are suggested for the management of CDB coastal resources. Each recommendation

[18] Alie, Kelvin. "St. Peter's Fisheries Co-operative Whale and Dolphin Project Plan of Action." International Fund for Animal Welfare (IFAW).

[19] Alie, Kelvin. "Terms of Reference: St. Peter's Co-operative Whale and Dolphin Project." International Fund for Animal Welfare (IFAW).

correlates to a specific objective of the monitoring study. These objectives are listed below (Table 14).

Table 14 Objectives of the socio-economic monitoring study

	Objectives
1	To monitor the socio-economic impacts of development
2	To increase stakeholder awareness of the importance of the resource base
3	To identify demands for alternative livelihoods
4	Encourage stakeholder participation in decision-making

- **Sustainable livelihoods projects targeting young fishers (Obj. 2 and 3)**

  Young men and women do not see fishing as a lucrative job opportunity so the majority of today's fishers are older. The youth are also greatly impacted by unemployment. 45% of the unemployed population is between 15 and 24 years of age, and 24% is between 25 and 34 years of age.[20] To keep the fishing industry thriving and ensure food security, there must be specific fisheries projects targeting young fishers. These projects can teach specialized fishing skills and familiarize young fishers with new technologies such as FAD fishing. There should also be an apprentice program encouraging young fishers to learn boat building.

- **Marketing eco-tourism in the area as a package (Obj. 3)**

  To encourage alternative livelihoods, the Colihaut, Dublanc, and Bioche communities must unite to market the eco-tourism opportunities in the area as a package. The recent development of the Kashibona Trail can be marketed along with the new whale watching and Syndicate/Morne Diablotin National Park hiking and bird watching. These sites can be promoted to tourists from the cruise ships thus targeting a market of over 500,000 persons who visit Dominica each year.[21] These sites can create new livelihoods as locals work as trail guides and boat operators; encouraging eco-tourism will also benefit existing livelihoods such as bus drivers, shop owners, restaurant staff, and others.

- **Creation of a Resource Management Committee in CDB area (Obj. 4)**

  To best promote and protect the coastal resources of the CDB area, there should be a committee comprised of individuals from all three communities. Each stakeholder group should be represented in this committee, including fishers, village councils, quarries, eco-tourism guides, and other community members. This Resource Management Committee could report to the Colihaut and Dublanc-Bioche Village Councils. Some of the Committee's responsibilities could include promotion of eco-tourism sites, promotion of clean-up campaigns, and monitoring of quarry inspections and compliance with regulations.

- **Reform and enforce quarry regulations (Obj. 1)**

  Currently, the greatest user conflict over coastal resources exists between the quarry and fishermen. The Ministry responsible for Mining is currently drafting a revised quarrying code

[20] *Caribbean Development Bank Commonwealth of Dominica Country Poverty Assessment*: *Final Report, Vol. 1*. Halcrow Group Ltd in association with Decision Economics, Willms and Shier, DPU University College London, and The National Assessment Team of Dominica. June 2003.

[21] "Tourism Arrival." Central Statistical Office. Government of the Commonwealth of Dominica.

and changing the inspection process so that only one individual inspects all quarries instead of various committees. Previously, a committee conducted quarry inspections. This process, instead of one individual inspector, allowed for greater transparency. Once finally revised, this quarrying code must be accessible to the villages that deal directly with quarries (Colihaut, Coulibistrie, Loubiere, Pointe Michel, Layou). All village councils should have a copy of the quarrying code as well as the Environmental Impact Assessment (EIA) for their specific quarry. In the case of Colihaut, the Council should have copies of the EIA from West Indies Aggregates, RDR, and PH Williams. Revised quarry regulations must also be enforced. Local government bodies like the village councils should take much responsibility in enforcing regulations for quarrying operations in their area.

- **Financial and technical support for the eat-fish and beach clean-up programs (Obj. 2)**

  The *Eat Fish* programs and beach clean-up campaigns are some of the most successful and well attended projects dealing with coastal resources. They target the primary school students to educate them about the importance of natural resources at an early age, and parents have noticed a marked difference in their children's awareness. The *Eat Fish in Schools* program should be funded to cover the cost of fish for the Dublanc and Colihaut primary schools each month. These lunches can be paired with a service learning program focused on environmentally friendly behavior and beach clean-ups. Students can thus learn and put their new knowledge into action. The schoolchildren will then pass along this information to their families.

- **Public relations campaign for fisheries in schools (Obj. 2 and 4)**

  In addition to training programs and apprenticeships for young fishers, the Fisheries Division should design an outreach program in secondary and technical schools. The program could start with a lecture or workshop prepared by fisheries officers to show off some of the most prosperous and successful fishers and others in fisheries-related business. This will serve to change the stigma that fishers are poor and uneducated. This public relations campaign could even be paired with the *Eat Fish in Schools* program in primary schools.

- **Investigation of the effects of quarries on the marine resources (Obj. 1)**

  Perceptions regarding quarrying are wide ranging. There is little to no information available regarding the environmental and health impacts of quarrying along coastal areas. An unbiased third party needs to conduct an investigation regarding these important questions to ascertain whether the quarries actually benefit the areas in which they operate. This investigation can complement ongoing research by the United States Agency for International Development (USAID) into the effect of quarrying on marine biodiversity.

- **Reforming the disaster relief policy and system (Obj. 4)**

  As discussed earlier in this report, the disaster relief system for fisheries has several flaws. The Fisheries Division should draft a disaster relief policy to address these problems. The policy should promote greater transparency to deter partisan influences. The fisheries officers who detail the losses of the fishers in their constituency should liaise with local government officials, namely the village councils, to determine accurate accounts of losses. Only those persons who are registered with Fisheries Division should be eligible for compensation for losses. Fisheries Division should also have a record of each fisher's equipment so as to verify losses.

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11 APPENDICES

Appendix 1: SocMon questionnaire

ID # Q # /

This survey is being done by the St. Peter's Fisheries Cooperative to figure out how to best manage the coast along Colihaut, Bioche, and Dublanc. Any information you give will be anonymous. You will not be personally identified in any reports. So that you know what is going on, you will be invited to a meeting where all the information from the whole survey will be presented

Village: .....

Date: .....(day/month/year)

Time: From: to (24 hour format)

This survey asks the head of the household about his or her opinions and some basic information about other people in the household. I would like to speak to the head of the household or the person closest to the head.

1. Current age (or Date of Birth, if known): (day/month/year)

2. Sex.
   - ☐ Male
   - ☐ Female

3. Marital Status:
   - ☐ Single
   - ☐ Married
   - ☐ Divorced
   - ☐ Widowed
   - ☐ Separated

4. Religion:
   - ☐ 1. Pentecostal
   - ☐ 2. Seventh day Adventist
   - ☐ 3. Roman Catholic
   - ☐ 4. Baptist
   - ☐ 5. Gospel Mission
   - ☐ 6. Jehovah Witness
   - ☐ 7. Rastafarian
   - ☐ 8. Other

5. What was your last level of formal school education?
   - ☐ 1. Primary School
   - ☐ 2. Secondary School/High School
   - ☐ 3. Dominica State College
   - ☐ 4. University
   - ☐ 5. None

6. What is your primary (main) source of income?
   - ☐ Fishing
   - ☐ Other. .....

7. What is your secondary (second main) source of income?

8. Are you satisfied with your standard of living?
   - ☐ Yes.
   - ☐ No.

9. How many people, including children, live in this household (under this roof)? people

ID # _____ Q # __/____

10. For each person over 16 years old, please answer the following questions:

Q 10a Relationship of household member to respondent	Q 10b Sex (M/F)	Q 10c Age	Q 10d Last Year of Completed Education	Q 10d Religion	Q 10f Primary Income Source	Q 10g Importance of Income – 1 highest to 5 lowest	Q 10h Secondary Income Source	Q 10i Importance of Income – 1 highest to 5 lowest

11. What else, if anything brings income into the household, including from overseas sources?

.....

12. What other income generating activities do you and other members of the household want to get involved in, but have not yet done so? For each alternative income-generating activity, what is the main reason why it has not been done yet by household members? (fill answers in the box below)

Q12 Alternative income generating activity	Reason for not pursuing it yet
1.	
2.	
3	

13. What organizations, of any kind, do you and other members of your household belong to? (fill answers in box below)

Q13. Relationship of household member to respondent	Kind of organization (eg. fishing cooperative, church group, sport team, PTA)	Name of Organization	Extent of Participation

14. What activities do you and others in your household do along the bay front and in the sea for work or fun?

.....

15. The marine resources of this area include the beaches, reefs, marine life, and fisheries. How would you generally describe the condition of each of these resources in the area of Colihaut, Biodac, and Dublanc? (fill answers in below)

a. ten years ago (1998)
b. five years ago (2003)
c. today (2008)

[Location]		10 years ago (1998)	5 years ago (2003)	Today (2008)
15 (a)	Beaches			
15 (b)	Reefs			
15 (c)	Marine life			
15 (d)	Fisheries			

5 very good
4 good
3 – neither good nor bad
2 – bad
1 very bad
DK – don't know
NA not applicable

ID # Q # /

16. How much influence do you think you can have on how the resources are managed?

- ☐ Very much influence
- ☐ Much influence
- ☐ Some influence
- ☐ Little influence
- ☐ No influence at all

17. Thinking about the resources mentioned above (beaches, reefs, marine life, and fisheries), what are the main problems that you have observed with these resources and what solutions do you recommend to solve the problems you mentioned? (fill in the box below)

Q17. Nature of problem	Recommended Solution
1.	
2.	
3.	

18. Whose responsibility is it to solve marine resource problems? (tick all that apply)

- ☐ Government Agencies (eg. Fisheries Division)
- ☐ Local Government (village council, parliamentary representative)
- ☐ Nearby Quarry Operators
- ☐ Fishermen, boat operators, people who use the resources
- ☐ Community in general
- ☐ Don't Know
- ☐ Other .....

19. Who should have the most responsibility for making decisions about managing resource problems? (tick only one)

- ☐ Government Agencies (eg. Fisheries Division)
- ☐ Local Government (village council, parliamentary representative)
- ☐ Nearby Quarry Operators
- ☐ Fishermen, boat operators, people who use the resources
- ☐ Community in general
- ☐ Don't Know
- ☐ Other .....

20. How many times a week do you normally have a meal that includes fish? Times per week

21. (a) Did you attend "Eat Fish Day" in Bioche last November? (if no skip to question 22)

- ☐ Yes
- ☐ No

(b) How much did this event(s) increase your awareness about the marine environment and fish?

- ☐ Big increase in awareness
- ☐ Some increase in awareness
- ☐ Little increase in awareness
- ☐ No increase at all
- ☐ Don't Know

(c) Do you think this is an important event?

- ☐ Yes
- ☐ No

22. (a) Do you have a child who participates in the "Eat Fish in Schools" lunch program? (if no, skip to #23)

- ☐ Yes
- ☐ No

(b) How much has the "Eat Fish in Schools" program increased your child's awareness of the environment and fish?

- ☐ Big increase in awareness
- ☐ Some increase in awareness
- ☐ Little increase in awareness
- ☐ No increase at all
- ☐ Don't Know

23. (a) Have you ever participated in a beach or river clean-up in the Colihaut, Bioche, Dublanc area?

- ☐ Yes
- ☐ No

(b). Which area? (circle all that apply)

Colihaut Bioche Dublanc

24. How important do you think it is to keep your marine environment clean?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not important at all

25. (a) Have you noticed a change in water quality over the last fifteen (15) years?

- ☐ Yes
- ☐ No

(b) If yes, how has the water quality changed?

.....

26. (a) Have you noticed a change in air quality over the last fifteen (15) years?

- ☐ Yes
- ☐ No

(b) If yes, how has the air quality changed?

.....

27. Does anyone in your household suffer from sinus problems or asthma attacks?

- ☐ Yes
- ☐ No

28. (a) Does anyone or has anyone in your household ever worked in the Colihaut quarry?

- ☐ Yes
- ☐ No

(b) If yes, how long has he or she worked at the quarry? ..... years

29. (a) Do you think the quarry has benefited your community?

- ☐ Yes
- ☐ No

(b) If YES, in what ways has the quarry benefited the community?

.....

(c) If NO, in what ways has the quarry not provided benefits to the community?

.....

ID # ____ Q # __/___

30. (a) Do you think the quarry should be regulated?

- ☐ Yes
- ☐ No

(b) If yes, who do you think should regulate the quarry? (tick all that apply)

- ☐ Government Agencies (eg. Fisheries Div, Forestries Div, EPU)
- ☐ Local government (eg. village council, parliamentary represenative)
- ☐ Special Committee or Task Force on Quarrying
- ☐ Community Members
- ☐ Don t Know
- ☐ Other .....

31. Which is the best way to get information to you about marine resources and their management? (Choose only one)

- ☐ Television
- ☐ School
- ☐ Flyers/posters
- ☐ Newspapers
- ☐ Workplace
- ☐ Radio
- ☐ Don t Know
- ☐ Other

32. Do you own a boat? (if no, skip to #35)

- ☐ Yes
- ☐ No

33. Length of boat? .....

34. Type of boat?

- ☐ Canoe
- ☐ Fibreglass
- ☐ Keel
- ☐ Other .....

35. Are you a fisher? (If answer is no, survey is complete.)

- ☐ Yes
- ☐ No

The remaining questions on this survey are for fishers only. This information is important so that the Fisheries Cooperative can understand how to best manage the needs of the community and fishermen

36. How many years have you been fishing?: years

37. What type of fisher are you?

- ☐ Part time (your main occupation is not fishing)
- ☐ Full-time (your main occupation is fishing)

38. If you fish part-time, what is your reason for not fishing full-time?

39. If you fish part time, what other types of work do you engage in besides fishing?

40. Are you a registered fisherman?

- ☐ Yes
- ☐ No

41. (a) Have you noticed a change in your fish catch over the last fifteen (15) years?

- ☐ Yes (b) If yes, how so?
- ☐ No

42. (a) Do you know of any places where fish gather to breed?

- ☐ Yes (ask b and c)
- ☐ No

(b) What kind of fish? .....

(c) Location/s

43. Have you had any fishing related training?

- ☐ Yes
- ☐ No

44. If yes, from whom?

- ☐ Fisheries Division
- ☐ Other .....

45. If you had training, what areas were you trained in? (Tick all that apply)

- ☐ Safety at Sea/Sea Survival
- ☐ First Aid
- ☐ Navigation
- ☐ Fish handling and quality
- ☐ Fishing gear and methods
- ☐ FADs (Fish Aggregating Devices)
- ☐ Outboard motor repair and maintenance
- ☐ Other

46. What additional training would you require?. (Tick all that apply)

- ☐ Safety at Sea/Sea Survival
- ☐ First Aid
- ☐ Navigation
- ☐ Fishing gear and methods
- ☐ Record keeping
- ☐ Fish handling and quality
- ☐ Outboard motor repair and maintenance
- ☐ FADs (Fish Aggregating Devices)
- ☐ Other. .....

47. (a) What has your catch been like over the past fifteen (15) years?:

- ☐ It has been increasing.
- ☐ It has remained stable.
- ☐ It has been decreasing.

(b) Describe the above trend.

.....

48 How is the value from the catch divided?

49 Estimated quantity of catch per fishing trip (in pounds)

50. (a) Do you ever give away fish to persons of your landing site community without asking for payment?.

- ☐ Yes.
- ☐ No.

(b) What is the value of the fish that you give away per fishing trip?..... dollars

ID # Q # /

51. How do you normally sell your catches? (Tick all that apply)

- ☐ As soon as you land your fish you sell to the community where you land the fish
- ☐ You transport your fish to other communities after selling within the landing site community
- ☐ You do not sell fish within the landing site community, but transport fish to other communities to be sold
- ☐ You sell fish to the Rosean Fisheries Complex
- ☐ You sell to your local Fisheries Cooperative
- ☐ You sell your catches to hotels and restaurants, etc.
- ☐ You export your fish to another island(s)
- ☐ Other

52. (a) Do you have any problems in selling your catch?.

- ☐ Yes.
- ☐ No

(b) If Yes, what problems?

- ☐ Transportation
- ☐ Price
- ☐ Poor fish quality
- ☐ Lack of appropriate facilities to market fish
- ☐ Don't Know
- ☐ Other: .....

53. (a) Do you think these problems can be solved?

- ☐ Yes. (b) How so? .....
- ☐ No (c) Why not?
- ☐ Don't Know

54. (a) Have you ever taken a loan for anything related to fishing?

- ☐ Yes
- ☐ No.

(b) If you have never taken a loan, why not?

- ☐ You did not need to take a loan
- ☐ You could not obtain enough security
- ☐ You had a bad credit record with the lending institution
- ☐ Other: .....

(c) If you have taken a loan, for what purpose?

- ☐ To purchase a boat
- ☐ To purchase an engine
- ☐ To purchase fishing gear and equipment
- ☐ To invest in another business that is non fishing related
- ☐ For other personal use

55. How often do you have to completely replace your gear (net, lines, pots).

- ☐ Sometimes or not at all for the year
- ☐ At least twice for the year
- ☐ More than twice for the year

56. What is your main type of fishing? (Choose only one)

- ☐ fish pots demersals
- ☐ hand line demersals
- ☐ hand line – pelagics
- ☐ trolling – ocean pelagics
- ☐ beach seine coastal pelagics
- ☐ other: .....

ID # ____ Q # __/___

57. What other types of fishing do you use? (Tick all that apply)

- ☐ fish pots – demersals
- ☐ hand line – demersals
- ☐ hand line – pelagics
- ☐ trolling – ocean pelagics
- ☐ beach seine – coastal pelagics
- ☐ other: .....

58. How many days a week do you fish?:

(a) During the peak season: .....
(b) During the slow/off season: .....

59. What problems affect you in improving your fishing operations? (Tick all that apply)

- ☐ Fish migratory patterns
- ☐ Vessel limitations – structure/size
- ☐ Unwilling crew
- ☐ Weather conditions
- ☐ Lack of facilities at the landing site
- ☐ Size of your engine (Horse Power)
- ☐ Low fish populations
- ☐ Other occupations taking up fishing time
- ☐ Lack of availability/access to fishing equipment
- ☐ Other: .....

60. (a) Do you own any safety equipment?

- ☐ Yes.
- ☐ No (b) If no, why not?

61. (c) If yes, what safety equipment do you own? (Tick all that apply)

- ☐ Flares
- ☐ Life ring, vest or other personal floatation device
- ☐ Mirror
- ☐ Flash light
- ☐ VHF radio
- ☐ Magnetic compass
- ☐ GPS
- ☐ Other: .....

62. What safety equipment do you normally carry with you on fishing trips? (tick all that apply)

- ☐ Flares
- ☐ Life ring, vest or other personal floatation device
- ☐ Mirror
- ☐ Flash light
- ☐ VHF radio
- ☐ Magnetic compass
- ☐ GPS
- ☐ Other:

On behalf of the St. Peter's Fisheries Cooperative, thank you very much for doing this survey!

Appendix 2: Data analysis outputs

List of Tables and Graphs to the SocMon Survey of the CDB Area

1. Fishers and Fishing Operations

Figure 1: Fishers by registration status and work-time in the industry

Work-Time	Registered?	Community			Grand Total
		Bioche	Colihaut	Dublanc	
Full-Time	No	12.5%	0.0%	0.0%	3.2%
	Yes	37.5%	40.0%	87.5%	51.6%
Full-Time Total		50.0%	40.0%	87.5%	54.8%
Part-Time	No	12.5%	46.7%	12.5%	29.0%
	Yes	37.5%	13.3%	0.0%	16.1%
Part-Time Total		50.0%	60.0%	12.5%	45.2%
Grand Total		100.0%	100.0%	100.0%	100.0%

Figure 2: Fishers who have and have not been trained

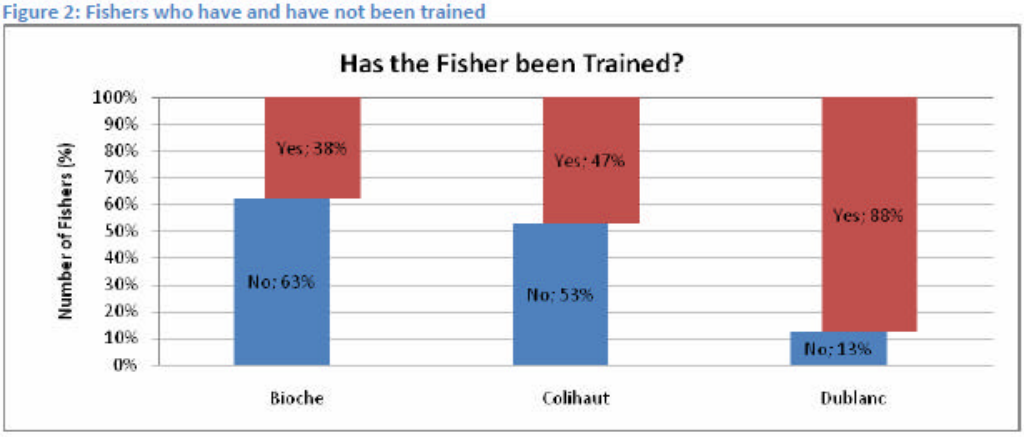

Figure 3: Training programs done by fisher respondents

Training Programs	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Boat Building	0%	3%	0%	1%
FADs	13%	13%	16%	14%
Fish Handling and Quality	13%	18%	16%	16%
Fishing Gear and Methods	20%	13%	13%	14%
Navigation	13%	10%	13%	12%
Other	0%	5%	0%	2%
Outboard Motor Repair and Maintenance	13%	13%	9%	11%
Record Keeping	0%	3%	7%	4%
Safety-at-Sea	27%	23%	27%	25%
Grand Total	100%	100%	100%	100%

1

Figure 4: Activities done by part time fishers when they are not fishing

Other Work	Community			Grand Total
	Bioche	Colihaut	Dublanc	
building boats	0%	14%	0%	9%
construction	33%	14%	0%	18%
cooking, cut hair, catering	0%	14%	0%	9%
farming	67%	0%	0%	18%
farming, tally man or any other kind of work available	0%	14%	0%	9%
government	0%	14%	0%	9%
masonry	0%	0%	100%	9%
mechanics, carpentry	0%	14%	0%	9%
security and masonry	0%	14%	0%	9%
Grand Total	100%	100%	100%	100%

Figure 5: The number of years for which persons have been fishing

Years	Community			Grand Total
	Bioche	Colihaut	Dublanc	
10-19	0%	20%	30%	19%
20-29	50%	33%	38%	39%
30-39	30%	27%	0%	23%
40-49	13%	20%	25%	19%
Grand Total	100%	100%	100%	100%

Figure 6: Catch trend over the past 15 years

Trend	Community			Grand Total
	Bioche	Colihaut	Dublanc	
It has been increasing	14%	20%	43%	24%
It has remained stable	14%	0%	14%	7%
It has been decreasing	71%	80%	43%	69%
Grand Total	100%	100%	100%	100%

Figure 7: Days fished weekly during the peak season – Table 1

Communities	Days fished weekly (Peak season)		
	Min	Max	Average
Bioche	2	6	4.63
Colihaut	2	7	3.50
Dublanc	2	6	4.75
Grand Total	0	7	4.00

2

Figure 8: Days fished weekly during the peak season Table 2

Peak Season	Community			
Days fished weekly	Bioche	Colihaut	Dublanc	Grand Total
2	13%	36%	25%	27%
3	13%	14%	0%	10%
4	25%	29%	13%	23%
5	0%	14%	0%	7%
6	50%	0%	63%	30%
7	0%	7%	0%	3%
Grand Total	100%	100%	100%	100%

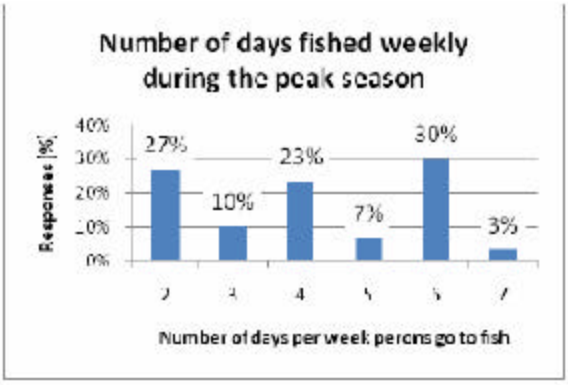

Figure 9: Days fished weekly during the off season – Table 1

	Days fished weekly (Off season)		
Row Labels	Min	Max	Average
Bioche	0	5	2.25
Colihaut	0	4	1.87
Dublanc	1	4	2.30
Grand Total	0	5	2.10

Figure 10: Days fished weekly during the off season Table 2

Off-season	Community			
Days fished weekly	Bioche	Colihaut	Dublanc	Grand Total
1	0%	15%	13%	11%
2	50%	62%	50%	56%
3	17%	15%	25%	19%
4	17%	8%	13%	11%
5	17%	0%	0%	4%
Grand Total	100%	100%	100%	100%

3

Figure 11: The value of fish given away free by fishers

Value of Fish (FCS)	Community			Grand Total
	Bioche	Colihaut	Dublanc	
<10	0%	21%	0%	10%
10-29	50%	21%	25%	30%
30-49	25%	7%	25%	17%
50-69	25%	14%	13%	17%
70 89	0%	14%	13%	10%
90-109	0%	14%	13%	10%
110-129	0%	0%	13%	3%
190-209	0%	7%	0%	3%
Grand Total	100%	100%	100%	100%

2. Eating Fish

Figure 12: The number of days weekly that persons eat fish

Days eating fish weekly	Community			Grand Total
	Bioche	Colihaut	Dublanc	
0	0%	1%	0%	1%
1	11%	20%	5%	14%
2	26%	13%	5%	12%
3	26%	20%	23%	22%
4	11%	21%	16%	19%
5	21%	3%	30%	16%
6	5%	3%	3%	3%
7	0%	19%	10%	13%
Grand Total	100%	100%	100%	100%

Figure 13: Respondents who attended "Eat Fish" day activities

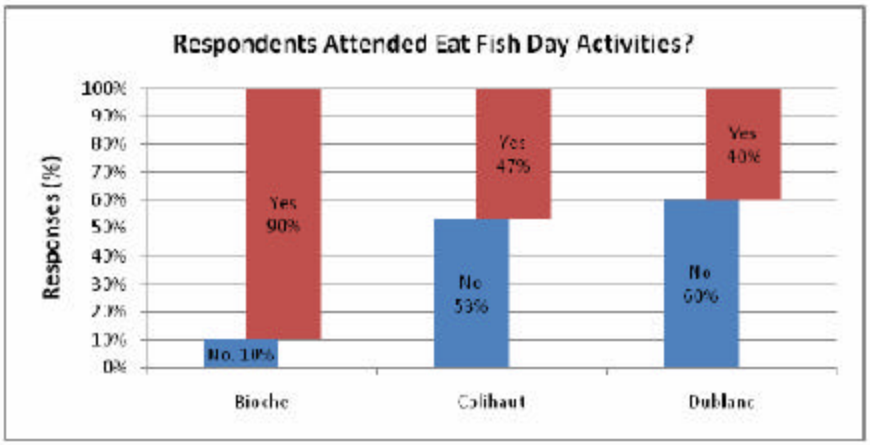

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Figure 14: Respondents whose children are part of the "Eat Fish in Schools" program

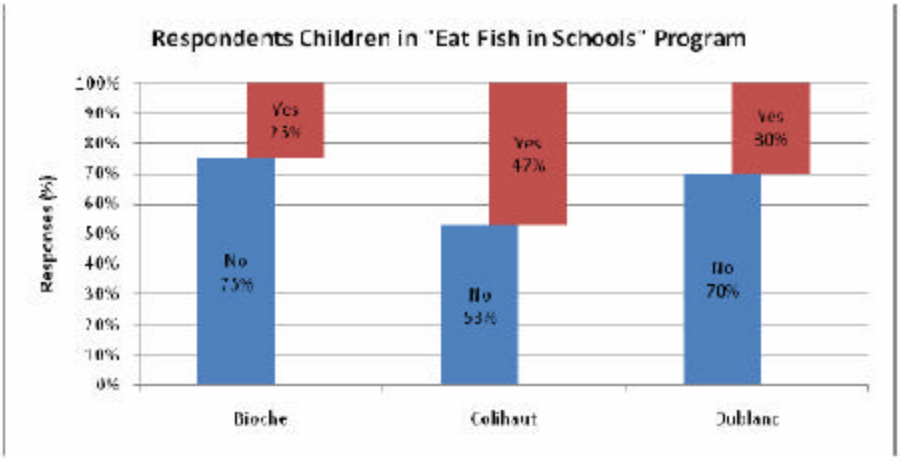

Figure 15: Respondents' children increase in awareness from attending "Eat-Fish" day

Eat-Fish Day Increase Awareness?	Community			Grand Total
	Bioche	Colihaut	Dublanc	
No increase at all	0%	7%	0%	4%
Little increase in awareness	40%	7%	17%	16%
Some increase in awareness	20%	14%	17%	16%
Big increase in awareness	40%	71%	67%	64%
Grand Total	100%	100%	100%	100%

3. Quarry

Figure 16: Respondents who believe that the quarry has benefitted the community

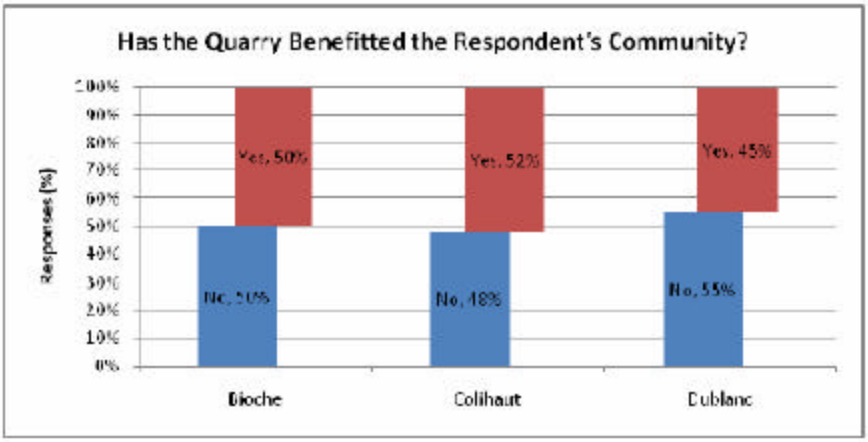

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Figure 17: The ways in which respondents believe the quarry has benefitted the community

Benefit	Community			Grand Total
	Biochc	Colihaut	Dublanc	
Access to materials	91%	20%	83%	47%
Employment	9%	68%	6%	43%
Sponsor community projects	0%	10%	11%	9%
Support local shops	0%	2%	0%	1%
Grand Total	100%	100%	100%	100%

Figure 18: Respondents with household members suffering from asthma

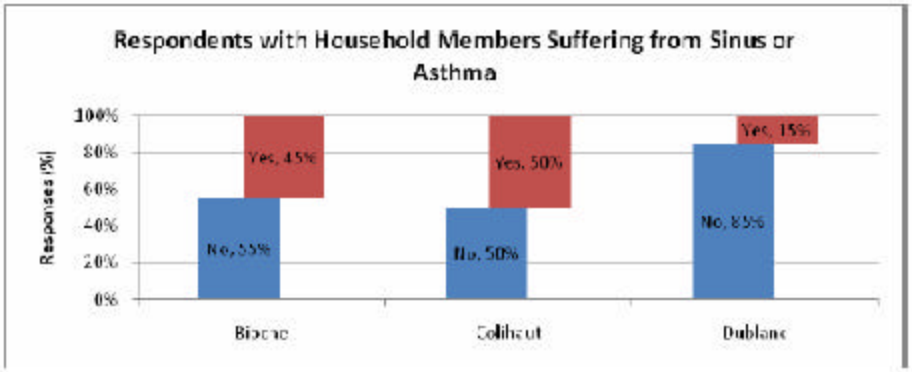

Figure 19: Respondents who think the quarry should be regulated

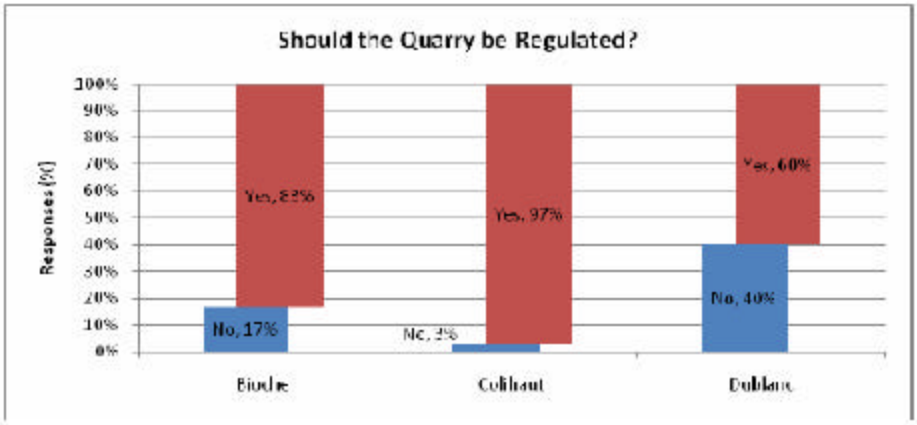

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Figure 20: Who should regulate quarries?

Quarry regulators	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Community Members	0%	19%	4%	15%
Don't Know	6%	1%	0%	1%
Government Agencies	88%	38%	85%	49%
Laws	0%	1%	0%	1%
Local Government	0%	25%	11%	21%
people who run the quarry should regulate themselves	0%	1%	0%	1%
Special Committee	6%	16%	0%	12%
third party arbitration with quarry	0%	1%	0%	1%
Grand Total	**100%**	**100%**	**100%**	**100%**

4. Resources

Figure 21: Respondents' perceived influence on resource management

Perceived influence	Community			Grand Total
	Bioche	Colihaut	Dublanc	
No influence at all	50%	27%	23%	29%
Little influence	35%	27%	30%	29%
Some influence	15%	33%	35%	31%
Much influence	0%	7%	10%	7%
Very much influence	0%	6%	3%	4%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 22: Decision makers identified for resource management

Decision maker for resource management	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Community in general	10%	14%	5%	11%
Don't know	5%	1%	0%	2%
Fishermen and boat operators and people who use the resources	0%	7%	3%	5%
Government Agencies	70%	43%	85%	60%
Local Government	15%	30%	8%	21%
Nearby Quarry Operators	0%	3%	0%	2%
Special Committee	0%	1%	0%	1%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 23: The main problems regarding resources in the CDB region

Problems	Community			Grand Total
	Bioche	Colihaut	Dublanc	
Bad fishing practises	4.5%	2.1%	12.0%	4.6%
Bad quarry practises	40.9%	21.9%	12.0%	21.6%
Boating safety	0.0%	0.0%	4.0%	0.9%

Coastal erosion	4.5%	3.4%	8.0%	4.0%
Deforestation	0.0%	0.7%	0.0%	0.5%
Destruction of resources	13.6%	30.1%	12.0%	24.3%
Lack of proper management	0.0%	0.7%	0.0%	0.5%
Limited assistance to fishers	0.0%	1.4%	0.0%	0.9%
Poor coastal development	0.0%	0.0%	2.0%	0.5%
Poor sanitation practises	36.4%	34.2%	50.0%	38.1%
Reduced fishing activity	0.0%	0.7%	0.0%	0.5%
River erosion	0.0%	4.1%	0.0%	2.8%
User conflict	0.0%	0.7%	0.0%	0.5%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Figure 24: Respondents' solutions to resource problems

	Community			
Solutions	**Bioche**	**Colihaut**	**Dublanc**	**Grand Total**
Opportunities, education and training	20.0%	22.7%	0.0%	18.1%
Improve, monitor and regulate quarries	0.0%	21.0%	6.5%	17.4%
Improve sanitation	0.0%	14.3%	22.6%	15.5%
Assist fishers and community	20.0%	0.4%	12.9%	9.7%
Close, stop or move quarry	0.0%	10.0%	3.2%	9.0%
Introduce or enforce regulations	20.0%	3.4%	19.4%	7.1%
Improve bay front	0.0%	5.0%	16.1%	7.1%
Restore resources	20.0%	4.2%	6.5%	5.2%
Government intervention	20.0%	1.7%	12.9%	4.5%
Impose fines	0.0%	4.2%	0.0%	3.2%
Other regulations	0.0%	1.7%	0.0%	1.3%
Research	0.0%	1.7%	0.0%	1.3%
Move fishing areas	0.0%	0.8%	0.0%	0.6%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Figure 25: The perceived state of marine resources 10 years ago

10 years ago				
Condition	**Beaches**	**Fisheries**	**Marine Life**	**Reefs**
Bioche				
Don't know	5.00%	10.00%	10.00%	10.00%
Good	75.00%	65.00%	65.00%	65.00%
Very good	20.00%	25.00%	25.00%	25.00%
Total	100.00%	100.00%	100.00%	100.00%
Colihaut				
Don't know	11.43%	21.43%	28.57%	57.14%
Very bad	2.86%	0.00%	0.00%	0.00%
Bad	24.29%	1.43%	4.29%	5.71%
Neither good nor bad	21.43%	10.00%	8.57%	1.43%
Good	28.57%	31.43%	30.00%	22.86%
Very good	11.43%	35.71%	28.57%	12.86%
Total	100.00%	100.00%	100.00%	100.00%

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Dublanc				
Don't know	7.50%	35.00%	35.00%	35.00%
Bad	12.50%	0.00%	0.00%	0.00%
Good	65.00%	50.00%	50.00%	50.00%
Very good	15.00%	15.00%	15.00%	15.00%
Total	100.00%	100.00%	100.00%	100.00%
Overall				
Don't know	9.23%	23.85%	27.69%	43.08%
Very bad	1.54%	0.00%	0.00%	0.00%
Bad	16.92%	0.77%	2.31%	3.08%
Neither good nor bad	11.54%	5.38%	4.62%	0.77%
Good	46.92%	42.31%	41.54%	37.69%
Very good	13.87%	27.69%	23.85%	15.38%
Grand Total	100.00%	100.00%	100.00%	100.00%

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Figure 26: The perceived state of the marine resources 5 years ago

5 years ago				
Condition	Beaches	Fisheries	Marine Life	Reefs
Bloche				
Don't know	0.00%	5.26%	5.26%	5.26%
Bad	21.05%	21.05%	21.05%	21.05%
Neither good nor bad	57.89%	63.16%	57.89%	57.89%
Good	21.05%	10.53%	15.79%	15.79%
Total	100.00%	100.00%	100.00%	100.00%
Colihaut				
Don't know	7.14%	20.00%	27.14%	55.71%
Very bad	2.86%	0.00%	0.00%	0.00%
Bad	20.00%	12.86%	12.86%	8.57%
Neither good nor bad	38.57%	37.14%	35.71%	22.86%
Good	31.43%	24.29%	18.57%	12.86%
Very good	0.00%	5.71%	5.71%	0.00%
Total	100.00%	100.00%	100.00%	100.00%
Dublanc				
Don't know	7.50%	37.50%	37.50%	37.50%
Bad	15.00%	5.00%	5.00%	5.00%
Neither good nor bad	55.00%	52.50%	52.50%	52.50%
Good	20.00%	5.00%	5.00%	5.00%
Very good	2.50%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%
Overall				
Don't know	6.20%	23.26%	27.13%	42.64%
Very bad	1.55%	0.00%	0.00%	0.00%
Bad	18.60%	11.63%	11.63%	9.30%
Neither good nor bad	46.51%	45.74%	44.19%	37.21%
Good	26.36%	16.28%	13.95%	10.85%
Very good	0.78%	3.10%	3.10%	0.00%
Grand Total	100.00%	100.00%	100.00%	100.00%

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Figure 27: The perceived state of the resources today

Today				
Condition	Beaches	Fisheries	Marine Life	Reefs
Dioche				
Don't know	0.00%	5.26%	5.26%	5.26%
Very bad	42.11%	47.37%	42.11%	42.11%
Bad	42.11%	42.11%	47.37%	47.37%
Neither good nor bad	15.79%	5.26%	5.26%	5.26%
Total	100.00%	100.00%	100.00%	100.00%
Colihaut				
Don't know	4.29%	15.71%	22.86%	54.29%
Very bad	17.14%	31.43%	31.43%	15.71%
Bad	14.29%	31.43%	27.14%	20.00%
Neither good nor bad	21.43%	10.00%	10.00%	7.14%
Good	37.14%	10.00%	7.14%	2.86%
Very good	5.71%	1.43%	1.43%	0.00%
Total	100.00%	100.00%	100.00%	100.00%
Dublanc				
Don't know	5.00%	35.00%	35.00%	35.00%
Very bad	30.00%	27.50%	27.50%	25.00%
Bad	55.00%	32.50%	32.50%	37.50%
Neither good nor bad	0.00%	0.00%	0.00%	2.50%
Good	10.00%	2.50%	5.00%	0.00%
Very good	0.00%	2.50%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%
Overall				
Don't know	3.88%	20.16%	24.03%	41.09%
Very bad	24.81%	32.56%	31.78%	22.48%
Bad	31.01%	33.33%	31.78%	29.46%
Neither good nor bad	13.95%	6.20%	6.20%	5.43%
Good	20.26%	6.20%	5.43%	1.55%
Very good	3.10%	1.55%	0.78%	0.00%
Grand Total	100.00%	100.00%	100.00%	100.00%

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Figure 28: Respondents' participation in beach clean-ups

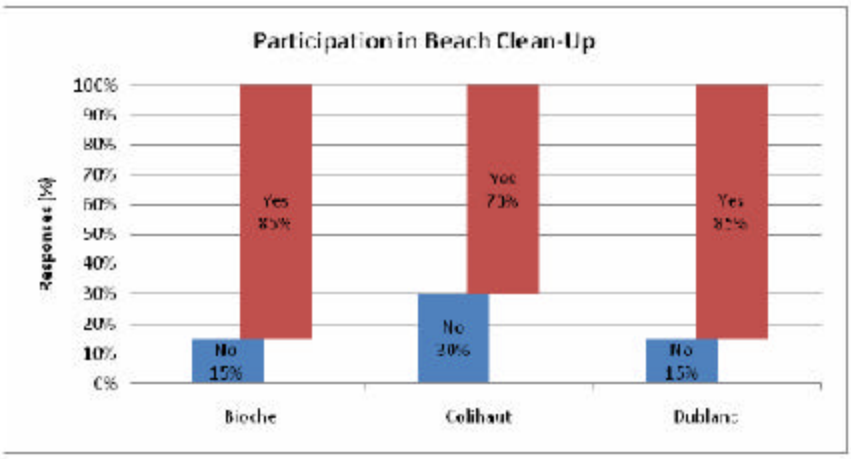

Figure 29: Changes to water quality

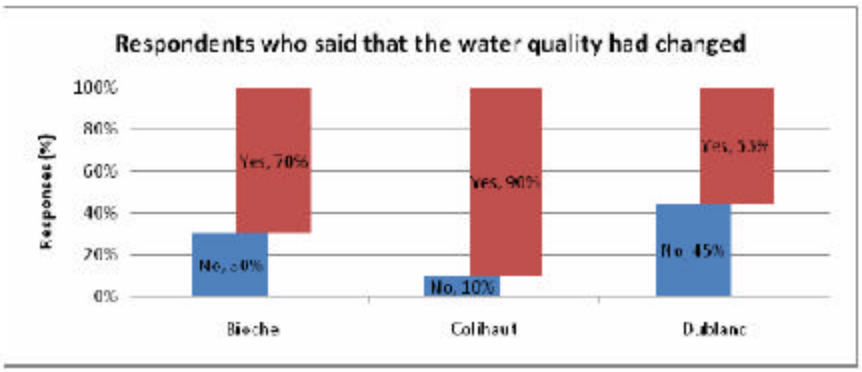

Figure 30: Respondents' perceptions regarding water quality changes

	Communities			
Water quality perceptions	Bioche	Colihaut	Dublanc	Grand Total
Causes illness	0.0%	1.6%	4.5%	2.1%
Heavily chlorinated	0.0%	1.6%	0.0%	1.0%
Low water pressure and levels	25.0%	0.0%	9.1%	5.2%
Unavailability of water	0.0%	3.2%	9.1%	4.2%
Water is dirty	75.0%	93.5%	77.3%	87.5%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

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Figure 31: Changes to air quality

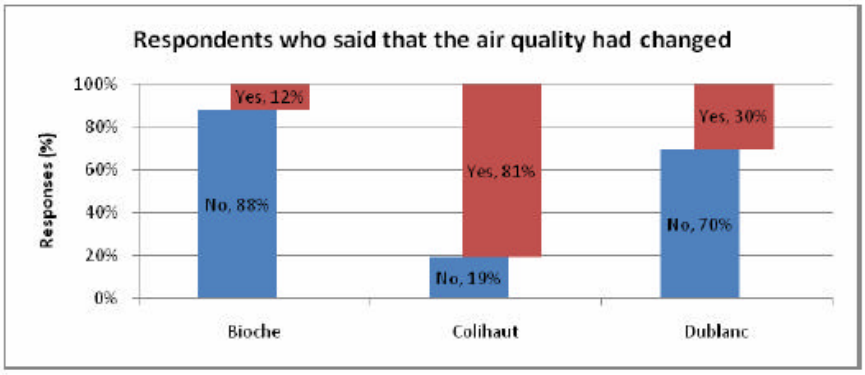


Figure 32: Respondents' perceptions regarding air quality changes

	Community			
Air quality perceptions	Bioche	Colihaut	Dublanc	Grand Total
Air dirty	100.0%	90.7%	58.3%	85.1%
Better air than before	0.0%	1.9%	8.3%	3.0%
Causes illness	0.0%	1.9%	8.3%	3.0%
Hotter air	0.0%	5.6%	25.0%	9.0%
Grand Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

5. Household

Figure 33: Ages of household members of respondents

	Community			
Age	Bioche	Colihaut	Dublanc	Grand Total
<16	0%	11%	16%	9%
16-25	48%	30%	26%	34%
26-35	18%	14%	16%	16%
36-45	9%	13%	23%	14%
46-55	15%	8%	6%	9%
56-65	3%	8%	3%	6%
66-75	3%	7%	0%	4%
>76	3%	9%	10%	8%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 34: Primary income by respondents' household members

Primary income	Community			
	Bioche	Colihaut	Dublanc	Grand Total
Administrative	4%	8%	13%	8%
Construction	24%	25%	4%	20%

Farming	0%	14%	9%	9%
Fishing	16%	4%	9%	8%
Medical	0%	4%	0%	2%
Public Sector	12%	10%	17%	12%
Retired	4%	10%	4%	7%
Service	32%	20%	17%	22%
Unemployed	8%	6%	26%	11%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 35: Secondary income by respondents' household members

Secondary income	Community			
	Bioche	Colihaut	Dublanc	Grand Total
Construction	50%	20%	0%	27%
Farming	50%	50%	0%	47%
Fishing	0%	10%	0%	7%
Service	0%	20%	100%	20%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 36: Activities done by the respondent's household on the bay side

Other household activities done on the bay side	Community			
	Bioche	Colihaut	Dublanc	Grand Total
Boating	0%	4%	0%	3%
Cleaning	8%	6%	32%	12%
Fishing related	54%	16%	22%	20%
Purchase fish	0%	0%	3%	1%
Recreation	38%	73%	38%	62%
Sell snacks	0%	1%	0%	1%
Waste disposal	0%	0%	5%	1%
Grand Total	**100%**	**100%**	**100%**	**100%**

Figure 37: Groups respondents and their household belong to

	Community			
Group type	Bioche	Colihaut	Dublanc	Grand Total
Church Group	0%	8%	23%	9%
Community Organization	3%	8%	3%	6%
Cultural Group	0%	1%	0%	1%
Fishing Co-operative	6%	0%	0%	1%
None	82%	67%	71%	71%
PTA	0%	5%	0%	3%
Sport Team	3%	5%	3%	4%
Youth group	6%	5%	0%	4%
Grand Total	**100%**	**100%**	**100%**	**100%**

6. Respondents

Figure 38: Age of respondents

Respondent Age	Community			Grand Total
	Dublanc	Colihaut	Dioche	
20-29	5%	11%	0%	6%
30-39	15%	28%	10%	20%
40-49	13%	20%	37%	23%
50-59	35%	13%	35%	23%
>60	33%	21%	20%	26%
Grand Total	100%	100%	100%	100%

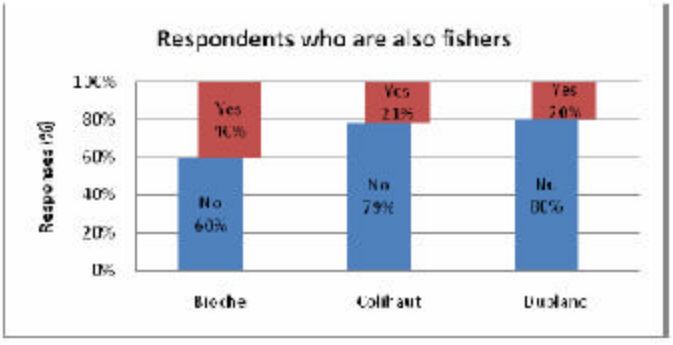
Figure 39: Marital status of respondents

Marital status	Community			Grand Total
	Dublanc	Colihaut	Dioche	
Divorced	3%	4%	0%	3%
Married	35%	29%	50%	34%
Separated	3%	1%	5%	2%
Single	55%	63%	40%	57%
Widowed	5%	3%	5%	4%
Grand Total	100%	100%	100%	100%

Figure 40: Education status of respondents

Education status	Community			Grand Total
	Dublanc	Colihaut	Dioche	
Primary	80%	66%	90%	70%
Secondary/High	13%	29%	5%	20%
State College	8%	10%	5%	8%
University	0%	3%	0%	2%
Grand Total	100%	100%	100%	100%

Figure 41: Respondents who are also fishers



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